ADVANCED

MANAGEMENT

MAY 1958
VOLUME 23 No. 5

13th Annual

S.A.M-A.S.M.E

MANAGEMENT ENGINEERING Conference

April 24-25

Hotel Statler

New York City

(See back cover of this issue for complete program)

In This Issue . . .

Organization Of The Planning Process
Richard C. Anderson

Perplexities In Economic Analysis For Equipment Decisions
Jack D. Rogers

Line-Staff Revisited
J. Rich Johnson

What Makes People Cooperative
Dr. W. C. Schwarzbek

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Published by **The Society for Advancement of Management,** the national professional organization of management people in Industry, Commerce, Government and Education, with national, regional and chapter activities.

UNIVERSITY of PENNSYLVANIA

The Wharton School of Finance and Commerce
Philadelphia, Pennsylvania

MANAGEMENT CONFERENCES

held in the

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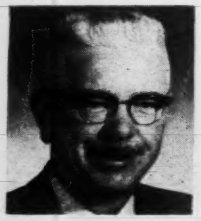
Dietrich Hall

ANNUAL WHARTON REFRESHER CONFERENCE

June 16 through June 27, 1958

Some of the Participants



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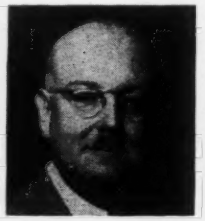

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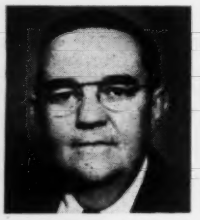

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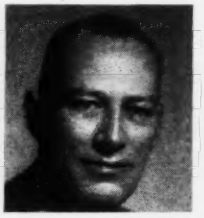

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The Contributions of Cost Reduction Programs
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Defining, Selecting and Training Systems Men
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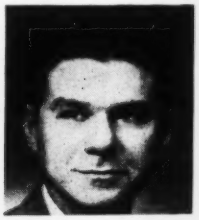

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The Manager's Problem and Its Analysis
Managerial Judgment and Its Analytical Tools
Systems Analysis and the Growth of Techniques
Information Input and Flow Planning
Organization and Information Output
Planning and Control in the Equipment System
Implementation of Advanced Techniques

Information for these conferences may be obtained from DR. ADRIAN M. MCDONOUGH, *Director,*
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In June ADVANCED MANAGEMENT . . .

The S.A.M Civic Affairs Report will outline typical Society activities in community projects covering a wide variety of subjects, now in operation all around the country.

Full reports on Civic Affairs projects will be made by RARITAN VALLEY, PHILADELPHIA, WASHINGTON, D. C., PITTSBURGH, HAWAII, INDIANAPOLIS, MILWAUKEE and WILMINGTON Chapters.

Other S.A.M Chapters presently engaged in formulating plans or working on projects for Civic Affairs improvements in their communities include ATLANTA, DETROIT, CHICAGO, KANSAS CITY, NORTHERN NEW JERSEY, RICHMOND, CLEVELAND, READING (PA.), NEW HAVEN, LOS ANGELES, MADISON (WISC.), BALTIMORE, PROVIDENCE, CINCINNATI, BOSTON, SAN FRANCISCO, WESTERN NORTH CAROLINA, PORTLAND, ALABAMA, LONG ISLAND, KNOXVILLE, DAYTON and HUDSON VALLEY (N. Y.).

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S.A.M Constitution

Production Editor: Beatrice Jones
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MAY 1958

Vol. 23 No. 5

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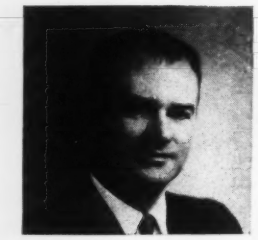

Chapter Management 1958-59

IF WE WERE about to set up a new business, there would be a number of key points to which we would be giving careful thought and attention.

1. We would want to define, or have clearly in mind, the basic purposes and objectives of our organization. In other words, why we are in business and what we hope to accomplish. Assuming that we had already determined our product or service, we would want to think through very definitely just where that product or service would fit into the economic picture in order to meet customers' needs.

2. We would want to establish an organization for accomplishing our objectives and see that the responsibilities of each position were clearly defined and understood.

3. We would want to think through the basic policies and plans under which we intend to operate the business. In doing this, we would be closely guided by the decisions which we had reached concerning our basic purposes and objectives.

4. We would also want to set some realistic goals or standards against which to measure performance and a time schedule for accomplishment. In order to do this properly, we would have to forecast conditions for varying periods ahead.

In performing these important functions, which should be accomplished simultaneously, we would be performing the basic job of management. These, of course, are the same functions which Chapter Management, and, to some extent, National S.A.M Management must perform every year at about this time. Since most of the jobs in our Chapter organizations are filled by different people each year, it is particularly important that each one of us approaches his job with the same degree of thoroughness and diligence that he would exercise if he were forming a new business of his own, of course, always learning from the experience of the predecessors. We should certainly give thought and attention to each of the fundamentals mentioned above: purposes and objectives; establishing and clarifying organization; establishing or clarifying all basic policies and plans; and, determining goals and time schedules for accomplishment.

It goes without saying that, in S.A.M. we get the best results when we encourage wide participation of officers and interested members in performing these basic managerial activities.

H. E. Lunken
National S.A.M President

Organization Of The Planning Process

by Richard C. Anderson
Organization Counselor
United States Steel Corporation
Pittsburgh

PLANNING is the foundation of business security. It is the means by which the business enterprise assures tomorrow's solvency. To plan is to determine a forward program for governing the future affairs of an enterprise.

The planning process starts with the assumption that the future will be different from the present, and it attempts to determine how the enterprise can take advantage of that difference. Planning thus becomes a device for change to meet the future.

Planning calls for a completely open mind and for elimination of the type of prejudice which says, "My mind is made up. Don't confuse me with facts." Men tend to close their eyes to facts which disturb them, and history is replete with the wasteful errors of blinded calculations. The 1948 Presidential election in the United States will go down as one of the greatest political miscalculations in U. S. history. In the automobile industry the errors of miscalculation have been the death of literally hundreds of companies.

Planning requires a "feel of the future." This "feel" may be a psychic sense, but it is found in greater abundance among people who are well grounded in the past and who understand the forces at work in the present. A plan should provide a springboard from the present; it should take conditions from where they are to where they ought to be. A veteran hiker lost in the woods instinctively "fixes" his location before attempting a course to safety. In business planning, too, we must know where we are in order to chart the future.

The process of business planning can be considered in four parts. *First*, analysis of factors affecting the future. *Second*, forecasting the future environment. *Third*, preparing the plan (including establishment of objectives). *Fourth*, installing the plan.

Factors Affecting the Future

In the analysis of factors affecting the future, there are three primary elements which affect the company's future opportunity: (1) The environment, (2) Internal conditions, and (3) Obligations of the enterprise.

Note: While U. S. Steel Corporation's planning encompasses all the elements of planning mentioned here, the present organization does not yet follow this program in all its details. *The Author.*

Environment

The business organization exists in three types of environment. First, in the total economy; second, in a particular industry; and third, in a specific geographic area. In each of these types of environment the company will want to consider its position in relation to its competition and to its customers or potential customers.

The Economy: If the enterprise is in a position to make its own independent appraisal of the total economy, it will want to consider a broad range of business indicators. The National Industrial Conference Board considers more than thirty conditions as significant barometers, among which are industrial production, wholesale prices, consumer prices, employment and unemployment, installment credit, merchandise exports and imports, bank debits, and many more.

In addition to these specific business indicators there will be other basic developments in the total economy. In 1958 several developments would appear to be significant: (1) Movements for a shorter work week. (2) Atomic energy.

Mr. Anderson has been with U. S. Steel since 1952. Prior to that time he was Personnel Manager for a California electronics manufacturer, Executive Secretary of the California State Senate Committee on Governmental Reorganization (Little Hoover Commission) (1949-52), Special Assistant in the City Manager's office in the City of Oakland, California (1949), and Salesman for a Fresno, California, wholesale dry goods company (1940-41). Since 1952 he has been a participant, speaker and conference leader in the seminar programs of the American Management Association.

(3) Electronics. (4) Transportation and communication. (5) Collective funds for insurance, pensions, etc. (6) Foreign trade and industrial developments abroad.

Indicators of more direct influences upon any particular company depend on the type of business in which it is engaged. Involved here could be such matters as: (1) Local population changes and the trends in population movements within a given region. (2) Political and government policies on road building as they affect the cement, road equipment, or automobile industries. (3) Social security as it affects recreation or potential recreation enterprises. (4) Union movements for a shorter work week as they affect recreation centers, hobbies, and travel. (5) Housing starts and their effect on the construction industry. (6) Automobile registrations as this affects tire and related automobile equipment businesses.

Competition: Competition is a major factor in the enterprise's environment. It is well to know as much about competition as possible, and it is desirable to find out: (1) In what portion of the total market is each competitor a significant factor and with what products? (2) What are his business policies—credit terms, delivery schedules, discount practices? (3) What is his product line—is it a single product or a diversified line? (4) Does he own his sources of raw material and retail outlets? (5) What is his financial structure—profit ratios, equity structure, distribution of earnings? (6) What customers does he serve and what business does he obtain from these customers? (7) What is the structure of his organization and caliber of his management personnel? (8) What are his sales territories, and where are his productive facilities?

Customers: Finally, the business must consider its direct and (in the case of nonconsumer goods industries) its indirect customers. The following are some of the questions which could be asked: (1) How reliable is the customer as a long-range buyer? (2) What are his present and prospective future product needs? (3) What are his income and purchasing power patterns; and what motivational forces—psychological, sociological, and cultural—affect or potentially affect his buying patterns? (4) How attractive is his business—quantitywise and profit-wise? (5) What are his historic relationships with competitors? (6) Is some part of his business more desirable than others? (7) What is the history of claims and complaints on former business with this customer? (8) When the customer is a business enterprise, these additional questions could be asked: (a) What is the pattern of his industry: is it expanding or declining; what is the pattern of its business cycle? (b) What is his financial condition—credit standing and stability? (c) What is his organization and management structure?

The importance of consumer acceptability cannot be emphasized too strongly. The sale of straight edge razors, for example, may have seemed like a sure thing in 1903; but consumer receptivity to a new idea changed the course of that industry virtually overnight—and the companies which failed to meet the Gillette challenge suffered the consequences. The automatic washer met another consumer need and presented a serious challenge to producers of conventional washers in the home laundry industry. This same story could be repeated a hundredfold: the electric typewriter, the sealed beam headlamp, television, metal panels for building exteriors, etc.

Internal Conditions

A complete evaluation of the health of an enterprise must include an analysis of top management policy, organization and management, personnel, finance, and operations. The purpose of this examination should be to identify the company's strengths and weaknesses in order to capitalize on the one and eliminate the other. In short, if the enterprise is to reach its goal, it must start with a full knowledge of its own potentialities. A more complete analysis of this internal appraisal will be considered later in connection with development of the company Plan.

Future planning should take into account the company's location—and the location of its industry—on the growth curve. Is it still in the rapid growth stage, has it levelled off at the top of the curve, or is it in a state of decline? The answers to these questions will provide a basis for determining such matters as capital expenditures, advertising and sales promotion, and product development. If a company appears to be in the early stages of a rapid growth, it should probably emphasize capital expenditures. If it is nearing the top of the curve, it should emphasize its advertising and sales promotion. If it is at the top or declining, it may want to emphasize new product development and diversification into new lines of business.

Obligations of the Enterprise

The company, if it is to survive, must maintain its own solvency through adequate profits and through the maintenance of a sound financial position.

The company also has a responsibility to its customers. It must be willing-and-able to change the course of its business to meet customer demands.

The business organization has yet another obligation: to its suppliers. Suppliers furnish goods of a required quality and quantity, but they are also a valuable source of aid for better products and new applications. It is in the company's own interest to keep suppliers advised of its potential product requirements, for the company's development may depend upon improvements in another's product. The development of sheet steel with deep drawing quality (flat steel which could be formed into extreme shapes), for example, made possible the "streamlined" automobile design. Suppliers and consumers working together can assure an adequate flow of goods and a reasonable market for these goods.

Finally, business, as a citizen in its community, has an obligation to that community. It should so conduct its affairs as to contribute to the community's welfare and to the preservation and growth of its institutions.

Forecasting the Future Environment

Forecasting requires the assembly of pertinent facts about the past and present. After these facts are assembled, they should be appraised by a representative cross-section of the enterprise: first, by people in direct contact with the market (such as salesmen, buyers, advertising men, and the like); second, by executives whose experienced judgement is pertinent to the facts; and third, by the people who have gathered and analyzed the basic data.

Judgments from a cross-section of the enterprise provide a base from which the forecast is developed. The forecast could include a variety of elements, including: (1) Estimates of general conditions in the total economy. (2) Estimates of specific conditions in the total economy which affect the company's business. (3) Estimates of the total demand for products sold by the company, classified according to the estimated de-

mand of major consumer groups. (4) Estimates of markets for the company's current and/or prospective product line by geographical area. (5) Estimates of sales possibilities within the limits of existing facilities and of sales opportunities with unlimited facilities. (6) Estimates of activity at peak, normal, and below normal conditions and for short- and long-range periods. What actually constitutes a short or long period depends on the company's individual situation, but in normal circumstances and for most industries the short range should probably be considered somewhere around one year. A standard for determining the optimum planning period could be: plan only for as long a period as will influence decisions in the present year.

Preparing the Plan

The purpose of a Plan is to adjust internal conditions to the predicted environment and thus obtain for the company the greatest advantage from that environment. The Plan's long-range phases should be sufficiently flexible to meet subsequent unforeseen conditions.

A coordinated Plan could incorporate both immediate programs and long-range objectives, and should cover in more or less detail all the elements of planning described below. If such were the form of the Plan and if the projected period were for five years, for example, the first year could provide specific operating programs and the other four years could prescribe general objectives. The Plan could be revised each year with a moving projection in which the second year of the first Plan would become the first year of the second Plan, and the year just beyond the first Plan (the sixth year) would become the fifth year of the second Plan.

Installing the Plan

Members must understand the Plan and must be in accord with its purposes. The Plan should incorporate the best thinking from every branch of the business, and the organization for planning should provide a mechanism for securing these ideas.

A set of standards against which to measure performance and to determine the attainment of goals should supplement the Plan. At the end of each planned period, each segment should be reviewed to determine which aspects have been completed, which are yet to be done, or which are to be revised for carry-over to the next planning period.

Elements of Planning

A well-developed planning program should consider all the factors bearing upon the operation of the enterprise. The following are suggested as representative of the factors to be considered in the planning activity.

First, *organization planning*. Organization planning determines what functions an organization requires, relates these functions in a systematic fashion, assigns authorities and degrees of responsibilities, and installs and periodically reviews organization plans.

The unit responsible for developing the organization plan could have available to it a committee of top management representatives to assist in formulating basic organization policies, to determine essential parts of the plan, and to advise in the plan's development. The organization planning program should include the following steps:

I. Determination of basic facts about the company. These facts might include such matters as: age of the industry and of the enterprise in that industry, type of personnel (scientific, sales, clerical, professional, etc.), number of employees, geographical dispersion, and characteristics of operation.

II. Determination of company objectives. This phase would deal with such matters as the form of the enterprise (holding company, operating company, management company), company growth (through internal expansion or by acquisition), product line development, future consumers, and policy on future diversification.

III. Determination of existing functions for each position, including such items as:
- A. Purpose or objective of the position.
- B. Specific activities required to carry out this objective.
- C. Authority necessary to carry out these activities.
- D. Reporting responsibilities.
- E. Supervisory responsibilities.
- F. Sources of instruction, advice, counsel, and policy.
- G. Relationships or contacts with other departments or with people outside the organization.

IV. Evaluation of existing and projected conditions. After all available facts are assembled, these facts should be evaluated in light of present and future needs.
- A. Are company and departmental objectives realistic, and do they take full account of the company's experience and resources?
- B. Are existing functions for each position adequate? Does each job fit into a sequence of operations, and is each person given sufficient authority to get his job done? Do supervisors understand their lines of accountability? Do individuals have free access to others with whom their work must be coordinated?
- C. Are all essential functions provided for? Are there any duplicating, overlapping, or conflicting authorities? Is there sufficient work force to carry the workload without undue burden? Are each unit's standards and objectives being met?

V. After all pertinent information is considered, the organization plan could include several parts.
- A. A statement of organization objectives.
- B. An organization creed which specifies what everyone is entitled to know about his job.
- C. A list of responsibilities common to all supervisory positions.
- D. Organization charts which show each position in a separate block and which relate all blocks by lines of authority and accountability.
- E. Responsibility charts which describe the primary responsibility of each position on the organization chart.
- F. Functional assignments which specify the part which each organization unit plays in the execution of major activities. The purpose of these assignments is to assure that all essential activities are provided for, that details of all activities are covered, and that duplication of effort is avoided. The assignments show how each position relates to every other in the execution of specific activities.
- G. Standard terms and organization nomenclature, including uniform position titles and definitions of organization terms.

The second element in top management planning is *product planning.* Product planning coordinates the efforts of all departments in maintaining and developing the product line. The objective of product planning is to develop and maintain the most profitable product line, utilizing the company's resources in the most efficient manner. Product planning includes the addition of new products, addition of new product lines, and elimination of existing products.

The product plan outlines ways and means of developing and maintaining the most profitable product line to meet projected marketing and competitive conditions and to achieve the maximum use of company resources.

The product planning program should include the following steps:

I. Determination of company product line capability including such matters as: production capacity, material supply, manpower skills and adaptability, financial resources, market and competitive conditions, sales distribution channels and methods, customer service programs, and inventory capacity.

II. Determination of company product objectives including such matters as: product integration, market penetration or withdrawal, sales distribution channels and methods, type of customer, customer product service, inventory and warehousing policies, and profit margins.

III. Evaluation of existing and projected conditions in the light of company objectives: Are existing products providing a useful place in the product line? Are adequate material supply sources available? Do proposed developments fulfill a substantial need in present or projected markets? Are company sales policies and methods adaptable to the requirements of the product? Do production and sales cycles of proposed products adapt to cycles of existing products? Are profit margins in the proposed new product consistent with company requirements? Are inventory methods of proposed products adaptable to company practices? Are advertising and sales promotion requirements of proposed products consistent with company experience?

IV. After these conditions are appraised, the product plan might include such matters as:

A. A schedule for the consideration of revisions, additions, or deletions of the product line.

B. Establishment of the product mix and modifications in the product mix.

C. Establishment of pricing schedules and profit margins.

D. Specification of quality standards, product design, and product names and packaging.

E. Establishment of advertising and sales promotion methods.

The third element in top management planning is *facility planning.* Facility planning is the determination of needed productive facilities, their types, capacities, quantities, and locations. It includes the planning of additions, alterations, replacements, construction, expansion, rehabilitation, and disposal; and the timing of such action. The objective of facility planning is to provide—in proper quantity, type, and location—sufficient productive facilities for maximum utilization of company resources and profitable participation in markets, both existing and projected.

The facility plan outlines ways and means of providing the enterprise with a sufficient type and quantity of facilities, properly located and adequately designed, for the maximum utilization of company resources and the maximum participation in available markets.

The facility planning program should include the following steps:

I. Determination of company facility conditions, including such matters as: facility capacity; accessibilty to labor and material supply, transportation facilities, and markets; operating costs; and facility maintenance.

II. Determination of company facility objectives, including such matters as: capacity expansion or construction, diversification, development of raw material sources, production methods, accessibility to markets or customer facilities and to raw material or material supply sources, transportation facilities, own-lease policies, and construction methods.

III. Evaluation of existing and projected conditions in the light of company objectives. Are resources available or potentially available in required quantity and quality? Do proposals take adequate account of foreseeable changes in technology? Are community services and facilities available where and when required? Are proposed construction costs and methods in line with company experience and projected conditions? Are community conditions favorable to development at the proposed facility sites?

IV. The facility plan might include such matters as:

A. A schedule of long-range facility additions, replacement, construction, expansion, rehabilitation, and disposal.

B. Selection of facility locations, construction methods, and material and equipment specifications.

C. Specification of cost standards and product capacities.

D. Specification of maintenance and protection measures.

The fourth element in top management planning is *operations planning.* This activity is concerned with production methods, standard practices, types and quantities of production equipment, and production capacities. It is to be distinguished from scheduling the daily operations of a production department. The purpose of operations planning is to provide the enterprise with the proper type, quantity, and capacity of production equipment in a proper location to achieve the maximum profitable participation in available markets.

The operations plan deals with means for maintaining the highest possible degree of efficient production, for keeping the enterprise abreast of developments in production technology, and for maintaining a profitable and timely flow of goods or services in adequate quantity and quality.

The operations planning program could include the following steps:

I. Determination of company production capabilities, including such matters as: location and productivity of existing equipment, standard practices and standard practice objectives, production costs, versatility of equipment, availability of materials and supply, availability of capital, and capabilities of present personnel.

II. Determination of company production objectives, including such matters as: production expansion or contraction, standard practice objectives, geographical dispersion, diversification, and technological developments.

III. Evaluation of existing and projected conditions in the light of company objectives. Are possible or proposed developments compatible with the company's past experience and existing capabilities? Are existing or proposed facilities capable of adapting to proposed equipment? Is production equipment sufficient in quantity and quality to meet proposed sales objectives? Are standard practice objectives consistent with sales, competitive, and technological developments? Are possible or proposed production methods compatible with the environment of the community in which the facility is located? Is the present personnel capable or can it be trained to operate proposed equipment?

IV. The operations plan could include such matters as:

A. Specification of production methods, proposed technological changes, and standard practices.

B. A schedule of proposed equipment additions, replacement, repair, and disposal.

C. Establishment of standards for determining equipment obsolescence.

D. Specification of cost standards and production capacities.

E. Specification of type and style of production equipment.

F. Policies on equipment suppliers and on terms with these suppliers.

G. Specification of maintenance requirements and schedules.

The fifth element in top management planning is *material supply and inventory planning*. Material supply and inventory planning is concerned with the type and quantity of stock to be acquired and placed in inventory and its systematic location, storage, and control. Its purpose is to supply the desired quantity of product to the customer and to the various segments of the enterprise. It seeks to assure an adequate quantity of materials and supplies in the proper place, at the right time, and at the least possible cost.

The material supply and inventory plan outlines ways and means for providing the enterprise with sufficient materials, supplies, equipment, and products to assure uninterrupted production and to assure an adequate flow of finished goods to customers.

The material supply and inventory planning program should include the following steps:

I. Determination of company material supply and inventory resources and practices, including such matters as: certainty and stability of supply sources, stockpiling and warehousing practices, capacities and potentialities of suppliers, supply and inventory quantity requirements, procurement and supply contracts or commitments, product standards and specifications, movement and turnover rates, and turnover rates, and inventory storage and control methods.

II. Determination of company material supply and inventory objectives including such matters as: development or release of supply sources, methods of storage and warehousing, diversification or retrenchment of sources, supply commitments, inventory investment and turnover rates, make vs. buy policies, and types, quantities, and quality of inventory.

III. Evaluation of existing and projected conditions in the light of company objectives. Are present supply and inventory conditions adaptable to proposed objectives? Are current or proposed sources capable of supplying potential requirements? Are inventory and storage methods and proposed levels adequate to serve proposed markets? Are proposed supply commitments within limits of company practices and resources?

IV. The material supply and inventory plan might include such matters as:

A. Policies on supply sources, such as whether to make or buy.

B. Types of suppliers and types of commitments to these suppliers.

C. Movement and storage methods.

D. Standards for determination of turnover—inventory ratios.

E. Formulation of types, quantities, and location of inventories.

F. Prescribing supply and inventory standards and specifications.

The sixth element in top management planning is *financial planning*. Financial planning provides a central point for determining the organization's future financial requirements and objectives, for developing plans and policies to fulfill those requirements and objectives, and for developing controls to assure compliance with financial plans.

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The financial plan outlines ways and means for meeting the company's financial requirements within a prescribed course and within a specified time.

The financial planning program should include the following steps:

I. Determination of company financial resources and practices, including such matters as: availability and cost of financial sources, company credit standing, profit ratios, stockholder or other owner sources, and policies on borrowings and security issues.

II. Determination of company financial objectives, including such matters as: accounts payable and receivable ratios, profit ratios, equity-working capital ratios, borrowings or stock issues, reinvestment, dividends, reserves, capital outlays, budgetary control, accounting systems, and depreciation and amortization schedules.

III. Evaluation of existing and projected conditions in the light of company objectives. Are present moneys being utilized in accordance with these objectives? Are dividend, reinvestment, and capital outlay policies consistent with planned objectives? Are capital, earnings, equity, and debt ratios adequate to fulfill company requirements? Do accounting and budgetary systems provide an adequate picture for future planning purposes? Are depreciation and amortization practices consistent with long-range objectives?

IV. After taking all these matters into account, the financial plan might include such matters as:

A. Specifying financial sources and potential financial sources for financing capital outlays and for working capital.

B. Utilization of existing financial resources.
C. Accounting and Budgetary or other Financial systems.
D. Accounts payable and receivable practices.
E. Depreciation or amortization policies.
F. Profit, debt, dividend, and retained earnings ratios.

THE seventh element in top management planning is *commercial planning*. Commercial planning is the estimation of future commercial conditions, the appraisal of these conditions, and the preparation of plans to capitalize on them. It includes the analysis of facts, observations, and opinions concerning demand and supply of products, sales potentialities of designated products and markets, channels through which such products are or may be distributed, means for the maximum development of markets, and sales performance.

The commercial plan outlines ways and means by which the company can take full advantage of projected market conditions.

The commercial planning program should include the following steps:

I. Determination of company commercial resources and practices, including such matters as: market participation, competitive conditions, selling methods, customer requirements, scope of product line, pricing, terms and conditions of sales, advertising methods and results, and sales territories.

II. Determination of company commercial objectives, including such matters as: type of customer, market participation, method of solicitation and distribution, profit margins, customer service, advertising and sales promotion methods, and meeting of competition.

III. Evaluation of existing and projected conditions in the light of company objectives. Are future customer and market participation objectives compatible with company experience? Are company resources adaptable to proposed distribution methods? Are projected competitive and market conditions consistent with proposed profit margins, terms and conditions of sale, solicitation and distribution methods, customer service, and advertising and sales promotion methods?

IV. Formulation of the commercial plan. The commercial plan might include such matters as:
A. Methods of marketing (use of dealership or other outlet methods, for example).
B. Means for the development of new markets and consumers.
C. Pricing policies.
D. Sales compensation methods.
E. Distribution or solicitation policies (for example, sales territories and quotas).
F. Customer service policies such as warranty, guarantee, or claims allowance policies.
G. Advertising and sales promotion policies.

The eighth element in top management planning is *human resource planning*. Human resource planning aims to see that the company is provided with the number and type of people it will need in the future. It includes several phases: first, how many people will be needed; second, what type of people will be needed; third, when will they be needed; and fourth, what training and development will be needed. A distinction is made between the planning of long-range requirements and the day-to-day personnel responsibilities of actual selection, training, and development programs.

The human resource plan outlines ways and means of providing the enterprise with an adequate number of properly experienced and trained people when and as they are needed. The plan provides a means for helping management achieve the maximum utilization of human resources.

The personnel planning program should include the following steps:

I. Determination of company personnel resources and practices, including such matters as: the number and types of skills and training found among present staff, production per man-hour, compensation scales and methods, training and development methods, and employee promotional channels.

II. Determination of company personnel objectives and needs, including such matters as: employment stabilization, compensation plans, desired experience and abilities, total numbers of personnel, productivity, personnel selection or training, and employee benefits policies.

III. Evaluation of existing and projected conditions in the light of company objectives. Is the present labor force capable of meeting future requirements? Are training and development programs geared to future needs? Are possible compensation plans adaptable to existing personnel? Are proposed productivity levels realistic? Are replacements available for key positions?

IV. Formulation of the human resource plan. The human resource plan might include such matters as:
A. Recruitment and employment methods and policies such as transfers, promotion from within, or indoctrination.
B. Training and education programs such as training methods, educational sources, company-sponsored training centers, or positions selected for training.
C. Management development, including methods for identification of management ability, performance rating, establishment of development positions, or outside recruitment.
D. Compensation, including ranges, incentives, or bonuses.
E. Employee benefits, including insurance, pensions, medical services, or company-paid memberships.

The ninth element in top management planning is *development planning*. Development planning investigates ways and means of securing greater opportunities for utilizing the enterprise's total resources. It appraises the enterprise's total capabilities and determines the types of business to which these capabilities are most adaptable. It appraises the enterprise's limitations and attempts to offset those limitations by balancing and complementing existing operations. It appraises the types and location of business in which the enterprise should be engaged in the future, and it investigates and collaborates in negotiation for the entry into new and disposal of existing segments.

The development plan outlines ways and means whereby the company's resources may be employed to the maximum advantage, taking into account all aspects of the company's capabilities and appraising the effect of possible changes in social, economic, and political conditions.

The development planning program should include the following steps:

I. Determination of company capabilities including such matters as: financial, personnel, and material resource potentialities; scope of current lines of business; scope of customers' lines of business; actual vs. potential market penetration; actual vs. potential product line and production capacities.

II. Determination of company objectives, including such matters as: lines of business, market penetration, diversification or entrenchment, integration, methods of financing, and methods of solicitation and distribution.

III. Evaluation of existing and projected conditions in the light of company objectives. Are company resources—financial, personnel, and material—adaptable to the company's projected development? Do objectives take full cognizance of trends in economic, social, and political conditions?

IV. Formulation of the development plan. The development plan might include such matters as:

A. Lines of business which the company might develop or from which it might withdraw, and the timetable for such action.

B. A schedule for the company-wide appraisal of proposed developments.

C. Factors to be evaluated in the appraisal of proposed developments.

D. Means for adjusting to change.

Organization for Planning

Every member of an enterprise shares responsibility for planning the future development of that enterprise. All have a stake in the future of the enterprise; and their own positions increase in significance as they contribute to its future development.

A coordinated plan should be developed at each operating level (that is, the level at which a work activity is directed and coordinated). This plan should incorporate all elements of that level's responsibility and should project a course of action which will take full advantage of the available resources and potential conditions. The plans of each level should be transmitted to the next higher level where they can be coordinated with those from other parts of enterprise.

At each planning level all phases of that level's activity must be coordinated and balanced to meet the realities of over-all objectives. At one time one segment may get more and at another time less of what it wants, but at all times the criterion should be: what is in the best interest of the total operation.

Plannng at the operating level contains three phases:

First: developing data and information about the operation.

Second: advising on how the operation may fit into the over-all department or company Plan, and developing internal plans where coordination with other areas is unnecessary or where unusual circumstances require immediate action.

Third: developing a program for carrying out its respective part of an over-all Plan after such a Plan is developed by top management.

Planning at the management levels also contains three phases:

First: coordinating the data and proposals from all subordinate areas to assure that all parts move forward on the same front at the same time.

Second: applying management viewpoints or confidential information (which may be known only by management) to the data and proposals from all areas.

Third: developing a consolidated Plan.

At each planning level the formalized planning activity—that is, the actual process of analyzing and integrating the intelligence available at that level and incorporating this intelligence into a composite picture—may require the full-time attention of one individual or a group of individuals, or it may require only the part-time attention of one individual; but at some point—even if only at the very top of the organization—the formal aspects of planning must be separated from execution. There are three fundamental reasons for this: First, the urgency of execution takes the full energies of one engaged in managing day-to-day activities. Second, too firm an attachment to past and present conditions, so often characteristic of one engaged in daily execution, tends unduly to influence the future course. Third, effective planning requires an over-all view beyond the scope of one activity.

At the top management level a consolidated planning organization could coordinate all company planning. This planning organization could perform several types of activity. It may provide a service to the operating organization (for example, organization planning and material supply and inventory planning); it may coordinate various segments of the enterprise (for example, product planning, facility planning, material supply and inventory planning, and organization planning); and it may serve top management in company-wide planning (for example, development planning). In its service and coordinating aspects the planning units operate best at the top of the organization either because effective execution requires the perspective of top management or because several areas of the enterprise must be coordinated. Its company-wide planning aspect the planning unit operates best at the top level because coordination can be achieved more effectively when they are closely linked in the same organization. Location of planning units at the top management level also makes possible a freer exchange of views and the sharing of new and better techniques among all specialty areas. Also, the requirements of working together in coordinated planning helps to broaden the perspective of each specialty.

Conclusion

The planning process enables business enterprise to meet the contingencies of the future—not because the future can be predicted, but because the enterprise, by being aware of the need for change, is prepared for change. We have seen that planning is essentially a device for change to meet the future, and that it involves coordination for all elements of the enterprise. If we are to be completely honest with ourselves, however, we must concede that, even though we use the most painstaking care, some completely unforeseen event—a revolutionary new production method, for example—can put all our plans to naught. But this is not to say that we are completely at the mercy of nature's whim. It points up, rather, that the basic ingredient in the planning process is the philosophy which tolerates change and which prepares the fertile fields of human genius for the meeting of any eventuality: this is the germ of the planning process. ■

Perplexities In Economic Analysis For Equipment Decisions

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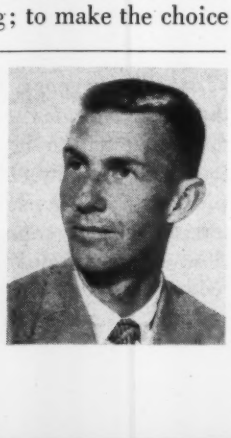
In our dynamic economy, volume of investment in plant and equipment is a key determinant of the level of economic activity and changes in the rate of investment by industrial organizations have amplified impact on national income. Industrial investments which increase productivity, lower costs, and provide for greater output have the three-way effect of sustaining current activity, conserving resources, and providing a widened base for further economic improvement. As the national industrial investment decision for any period is a composite of numberless decisions made in individual business firms, the methods of economic analysis employed in reaching decisions to purchase new or replace old equipment deserve attention.

When money is tight, the revolutionary developments in electronics and other fields which have begun to make automation of production and data processing a reality also make investment in new facilities imperative in much of industry. Other factors, such as the need to provide for a growing and increasingly mobile population, add to investment pressure. The need for rational investment decisions never has been more urgent.

Rational decision-making is difficult enough when there are many competing demands for investment and investment costs are high for all alternatives. It is doubly difficult when, as at present, the rate of technological change also is high, for an uncomfortable degree of uncertainty becomes inherent in the analyses on which decisions are based. To choose between pieces of equipment which might be purchased when changes in their prices, capacities, efficiencies, and lives are likely to be slow and continuous is one thing; to make the choice when there is a good possibility of discontinuous change, even elimination of the equipment's function, is quite another thing.

While theoretical discussion of methods for decision-making under uncertainty, such as application of game theory and statistical decision functions, are appearing in management journals with increasing frequency, their use by executives in industry remains limited. For some time to come, the standard varieties of economic analysis for equipment decisions to be mentioned later will continue to be used in most cases where formal analyses are made at all. In view of this, it is important that the best use be made of the established analytical approaches. Faulty methods may cause investments to be passed up which really are economically justified, lead to unbalanced development of production capacity, or result in wasteful expenditure. Sound methods of analysis then are a necessary condition for making good decisions; unfortunately they are not a sufficient condition. Meticulous attention to method may be largely misdirected effort, as will be seen later, if other critical factors are neglected. This does not say, however, that how an analysis is made is unimportant; it only cautions against excessive concentration on form.



A native of Kearney, Nebraska, Professor Rogers received a B.S. in Mechanical Engineering from the University of California in 1941, and a Master of Business Administration in 1947 from the University of California. In 1953 he received a Ph. D. in Industrial Economics from the Massachusetts Institute of Technology. He has been associated with the University of California's Department of Business Administration since 1953. Professor Rogers is a Member of the Board of Directors and Student Chapter Coordinator of the San Francisco Chapter of the S.A.M, and Faculty Advisor for the S.A.M Student Chapter at the University of California.

It might appear at first glance that there is little cause for concern about the quality of selection and replacement decisions made by industrial executives. One could reason that these decisions always have had to be made so that a large body of experience and knowledge exists. The presumption that the situation for decision is a well defined one yielding to quantitative analysis and with clear cut criteria also is comforting. This line of thought is upset by a number of things, however. First, whether experience with a certain kind of problem improves decision-making depends on how that experience is used. Often it remains nothing more than a series of particular unconnected cases or, worse, it is distilled into rules-of-thumb of doubtful validity which are applied in lieu of thought. Second, just how equipment decisions are made in practice is not as well known as might be supposed and whether available knowledge really is widely used is an open question. There is considerable agreement among theorists on major questions in equipment analysis, but the extent to which accepted theory is put to use by managers and the weight given to results of formal analyses when they are used have not been established by surveys in industry or any significant number of case studies. Finally, it is only on the surface that equipment decision situations are well defined. In oversimplified terms, what is to be decided is which of different methods and alternative equipment units should be selected to perform a given proposed function or whether and with what the methods and equipment used to perform an existing function should be replaced. This much is clear. The decision-maker, however, unless he is blissfully unaware of the true nature of the problem, immediately is plunged into a welter of possible criteria for decision, associated schemes for analysis, and questions regarding relevancy and reliability of data. In actuality it is hard to conceive of a class of management decisions more surrounded with imponderables and beset by uncertainty. At the same time, the magnitude and relative permanence of equipment decisions make them crucial for a firm's success.

It is about at this point that many executives become so perplexed that they throw up their hands. The usual responses are to fall back on "judgment," i.e., discard the idea of constructing a complete and quantitative economic analysis, rationalize that the available data are too imperfect to use, apply some rule-of-thumb, or follow blindly a procedure given in a handbook. The purpose of this article is to review some standard approaches, point out the principal assumptions and choices which must be made en route to equipment decisions, and mark the logical traps which lie along the way. It is hoped that the reader will agree at the end that quantitative equipment analysis is neither so confusing nor so simple as it sometimes has been made to appear and that it can and should be used.

Basic Methods of Quantitative Analysis

All analytical approaches to equipment investment decisions derive directly or indirectly from the concept of profit maximization. All are intended to compare quantitatively the effects of each of a set of proposed changes in operations which entail investment to enable identification of the alternative which maximizes prospective profit or optimizes some variable upon which profit depends. Since the outcomes of investment decisions are spread over a number of operating periods, time must enter as an explicit or implicit variable. For example: alternative pieces of equipment with identical first costs and annual operating costs but with different life expectancies are not equivalent; alternatives with identical first costs, equal lives, and equal total operating costs over their lives are not equivalent if the time distributions of their operating costs differ.

Most equipment analyses fall into one or the other of two groups. One group includes exact and approximate methods of determining cost or profit per period, rate of return on investment, or the payout period; the other includes methods of calculating the present worth of future expenditures and receipts associated with alternative investments. For the same data, of course, results obtained by use of methods in one group generally can be translated in terms of methods from the other group. In both groups of methods the time variable is handled in part through inclusion of interest as a component of cost. All are equally applicable to problems of initial selection of equipment or replacement of equipment.

The gist of the methods can be shown by setting out for each the terms which must be evaluated for each alternative assuming constant costs and incomes per period and end-of-period interest calculation. The following symbols will be used:

E = total initial expenditure for equipment, including installation

S = residual value of equipment at end of life when traded in, resold, scrapped, or otherwise disposed of.

A = net amount invested = $E-S$

n = life of equipment, measured in operating periods (usually years)

D = depreciation (straight line) per period = $(E-S)/n$

c_o = operating cost per period, i.e., all cash outlays assignable to operation and maintenance of equipment

I = net income per period from which costs of equipment must be met

i = interest rate

f_r = capital recovery factor, the quality by which an investment is multiplied to ascertain the constant payment per period which will repay the investment in n periods with interest at rate i per period $\left[f_r = \frac{i(1+i)^n}{(1+i)^n-1}\right]$

f_w = present worth factor (uniform series) $\left[f_w = \frac{1}{f_r}\right]$

f_q = present worth factor (single payment) $\left[f_q = \frac{1}{(1+i)^n}\right]$

f_s = sinking fund factor $\left[f_s = f_r - i\right]$

1. Period analyses

A. Cost per period method

1. "Exact" cost per period (c_e)

$$c_e = f_r A + c_o + is$$

2. Approximate cost per period (c_a)

$$c_a = i\frac{A}{2}\left[\frac{n+1}{n}\right] + c_o + is + D$$

B. Profit per period

1. "Exact" profit per period (p_e)

$$p_e = I - c_e$$

2. Approximate profit per period (p_a)

$$p_a = I - c_e$$

C. Average net rate of return

1. "Exact" average net rate of return (r_e)

$$r_e = \left[I - c_o - is - f_r A\right] \Big/ \left[\left(\frac{iA - f_r A}{nd}\right) \quad f_c = \left(\frac{f_r A + is}{i}\right)\right]$$

2. Approximate average net rate of return (r_a)

$$r_a = \left[I - c_o - is - D - \frac{iA}{2}\left(\frac{n+1}{n}\right)\right] \Big/ \frac{E+S}{2}$$

D. Payout period

1. "Exact" payout period (t_e) for a given interest rate or required earning rate, i

$$f_r = \left[I - c_o\right] \Big/ \left[E - \left(\frac{S}{(1+i)^n}\right)\right]$$

Having solved for f_r, the payout period is found from:

$$t_e = \log\left[\frac{f_r}{f_r - i}\right] \Big/ \left[\log(1+i)\right]$$

or by entering a capital recovery factor table with argument i, finding f_r in the body of the table, and looking across to the number of periods which corresponds to f_r and i.

2. Approximate payout period (t_a)

$$t_a = \left[E - S\right] \Big/ \left[I - c_o\right]$$

II. Present worth analyses

A. Present worth of costs (W_c)

1. $W_c = A + f_w c_o - f_q s$

2. Present worth of profits (W_p)

$$W_p = f_w (I - c_o) + f_q s - A$$

B. Capitalization method

1. Capitalized cost (W_c') of perpetual series of renewals.

$$W_c' = A + \frac{f_s A}{i} + \frac{c_o}{i}$$

2. Capitalized profit (W_p') from perpetual series of renewals.

$$W_p' = \frac{I - c_o}{i} - A - \frac{f_s A}{i}$$

Two varieties of period formulae are shown: The "exact" methods take account of the fact that interest changes constitute a larger proportion of a constant payment (which will amortize an investment over a certain term of years) in early years and decline throughout. (It should be noted that the

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methods are not entirely exact in that they lump all payments at the ends of periods and include residual value at full amount rather than discounting it). The approximate methods assume that the principal amount is amortized by a series of equal payments (straight line depreciation) and include modified simple interest (the insertion of the factor $\frac{n+1}{n}$ improves the approximation) on the average investment. Values of the factors (f_r, f_c, etc.) for various periods and interest rates may be found in compound interest or annuity tables.

Application of the period cost or profit methods is straightforward; the alternative for which the cost per period is lowest or profit per period is highest is selected, all other things being equal. The rate of return method computes for each alternative the average net return per period on capital invested after amortization and interest have been provided for and the alternative showing the highest rates is selected, again, all other things being equal. Payout period calculations indicate the lengths of time within which alternative investments can be repaid from the net income attributable to them; the shorter the payout period, presumably, the more desirable the investment. Calculations of present worth discount the future receipts and expenditures for alternative courses of investment to arrive at figures which measure their relative value at a base time; alternatives with low present values (or capitalized values) for costs and high present values for profits normally are preferred.

Selection of Criteria and Methods

The question of which method to use to analyze an equipment selection problem can be resolved only in conjunction with the choice of a criterion for decision. Appropriateness of criteria is determined by the objectives which are being aimed for and the nature of the information available. Here the matters of full optimization versus sub-optimization and application of multiple criteria must be considered.

Let us look first at criteria which can be satisfied by the answers which emerge from computations of the type previously discussed. Maximization of long-run profit—or what is the same thing, maximization of present value of the enterprise—is a universally accepted objective. If maximum long-run profit is given a broad meaning, it even may be regarded as the prime objective of enterprise. Assessment of alternative courses of action in terms of this objective with complete correspondence of objective and criterion is possible only when *all* alternatives open to the enterprise can be examined and acted upon simultaneously, i.e., when full optimization, in which the marginal profit rate is made the same for all alternatives taken, is possible. This situation seldom exists and the alternative which satisfies the maximum profit criterion so far as the section of the enterprise immediately affected by the decision is concerned when taken together with decisions made at other times or places may give a combination which is less than optimum. For example, a decision today to use some of the company's limited funds for purchase of new equipment to reduce manufacturing cost may foreclose another desirable project tomorrow. Obviously an omniscient management never would allow this to happen, but there are few of them around. Limitations of time and knowledge compel delegation and dispersion of decision-making and, consequently, creation of situations in which only sub-optimization may be possible. It should be recognized, therefore, that equipment decisions do not make themselves even when based on quantitative analysis which allows numerical comparison of calculated outcomes with criteria. On the other hand, the more faithfully criteria represent over-all objectives, the more appropriate they are and the less trouble the decision-maker has in reaching conclusions.

In addition to the "part versus whole" perplexity, there is also the "competing criteria" problem which arises when two or more bases might be used for making a choice. Maximization of the rate of return on invested capital amounts to the same thing as maximization of total profit for the same investment base, but not necessarily otherwise. When an enterprise is operating close to its capital limit and investment opportunities are plentiful, maximization of rate of return on individual equipment investments is indicated, but when capital is more plentiful and profitable investment opportunities are scarce, taking a high return alternative which precludes taking a low return alternative with a greater total profit not only will not maximize total profit but may not maximize over-all return if no further opportunities present themselves. While choice among quantitative criteria often can be made by reference to a more inclusive criterion (for example, in a particular case cost minimization may be adopted as a criterion rather than output maximization because it is more likely to be consonant with the more general criterion of profit maximization), choices among criteria of different kinds—as non-quantitative versus quantitative—are less easily made. Whether to choose the machine which has the best appearance or the one which has the lowest cost can be decided only by personal preference unless the effect of appearance can be expressed quantitatively. When several criteria must be applied simultaneously, the result of application of each must be weighted implicity or explicitly in coming to a compromise decision.

OFTEN the nature of the information available to the decision-maker requires that a sub-optimizing criterion be used. When a number of different processes contribute to the production of a single product, the effects of equipment changes in the various processes may be so confounded that the ultimate effect of a single change cannot be isolated. Similarly the question of the share of revenue to be assigned to each of joint processes may have no clear answer. Equipment solutions then have to be based on that information which is available and employ narrowed criteria so that some equipment decisions may have to be based on cost or some other restricted criterion alone.

The general method of quantitative analysis to be used is set by the choice of decision criterion, since it and the outcome of the analysis obviously must be expressed in compatible terms. Whether an approximate method should be used depends on the amount of precision desired and the amount available. Although it may appear that since all methods consist of comparison of alternatives, the right alternative will be selected regardless of precision, this is not necessarily so; occasionally for the same data different choices are indicated when approximate methods are used than when exact methods are used. This is not the principal difficulty, however.

With a criterion such as rate of return or payout the question may be as much whether *any* alternative should be selected as *which* of those available, i.e., absolute magnitudes of outcomes are important as well as relative magnitudes. One contrary argument for use of approximate methods is that exact methods may be wasted on cost, earning, equipment life, and residual values data which are estimates and hence may contain errors larger than the difference between exact and approximate calculations. This is something that must be established for the particular case and not merely presumed, for there is no point in compounding inaccuracies. Use of approximate formulae with recognition of their limitation is not likely to cause trouble if they are used throughout an analysis and not mixed up with exact methods. The sort of approximation that does cause trouble is dropping out factors on the presumption that they are negligible, making other convenient but loose assumptions, or approximating inconsistently for different alternatives.

The intent of this section has been to focus on the point that choice of criterion and method are decisive for the validity of an equipment analysis. Other choices which can best be illustrated by reference to particular methods also may be decisive. Most of the remainder of the article therefore deals with the principal points at which choices must be made or assumptions recognized in preparing an economic analysis for equipment selection.

Time Period Problems

Whichever quantitative method is applied, questions arise as to the time span the analysis is to cover and how differences in expected lives of equipment alternatives are to be handled. Present worth analysis automatically eliminates the second question but not the first. The principal feature of the present worth method is that it makes explicit provision for length of life, since receipts or expenditures distant in time are discounted more heavily than those near realization. What should be taken as the lives of the alternatives and the discount (interest) rate is left to the analyst and we must review these issues later. Capitalization methods dispose of both time span and length of life problems by the assumption of perpetuity.

All period methods except payout require the analyst to choose a definite planning horizon and determine lives for alternatives. Cost per period, for example, offers insufficient basis for choice except when the number of periods is the same for each of the alternatives. If equipment lives differ, either of three things may be done in period calculations: (1) it may be possible to find some number of reinvestments in the shorter-lived alternative which total the same as a smaller number of reinvestments in the longer-lived alternative, in which case cost per period is a valid measure (for the period selected); (2) a fixed planning horizon may be selected, the lives of each alternative stretched (by considering reinvestments) or shrunk (by calculating new residual values for shortened lives) to fit and appropriate capital recovery factors or depreciation rates used; (3) the cost per period for each alternative may be assumed to continue indefinitely.

PAYOUT period calculations do not entirely avoid time span and equipment life problems, even though their outcomes are expressed in time units. Here the difficulty is one of interpreting the meaning of the outcome. In general, if the criterion of a certain period within which investments must pay out is set in advance, there is no confusion. Either the payouts of proposed equipment investments show that they will pay for themselves within the stipulated period or they do not; that proposal will be accepted which is the quickest to pay out of those satisfying the period criterion. However, if no required payout period is fixed, some indeterminancy still is left after the quickest payout has been found. Comparison of the payout period to the functional life of the equipment, i.e., the length of time it can be used at the costs on which the payout calculation is based, aids somewhat in removing this indeterminancy. It hardly needs to be added, however, that equipment which does not "pay for itself" within its functional life still may be the best available alternative.

Determination of life expectancies of equipment admittedly is a perplexing problem and decisions made at this stage of analysis heavily influence outcomes. A statistical approach yielding the mean life expectancy of particular classes of equipment requires that there be enough cases available to give significant estimates and that the decision-maker be satisfied with what has happened as a basis for further analysis. It may well be that the lengths of time a company has retained equipment has no relation to "true" equipment life and only represents the patterns of past replacement decisions, most of which may have been wrong. Since either obsolescence or physical deterioration may turn out to set the effective limit on equipment life, the obvious course seems to be to estimate the effect of each and adopt the shorter indicated life. Information provided by equipment manufacturers, gathered from other users of equipment, or obtained through other avenues should be used by all means. Foregoing any attempt to estimate the life of equipment alternatives and adopting an arbitrary period, particularly an unreasonably short or long one, is folly. Anyone who takes the time to insert a series of assumed life values in the formulae with other data constant soon will discover that outcomes can be forced to practically any result desired and the formulae are only as good as the information which goes into them.

Valuation Problems

When equipment analysis includes the alternative of retaining existing equipment, it is necessary to place a value on it for the purpose of calculating its capital cost under period methods or determining its present worth. What is sometimes forgotten at this point is that only what will happen in the future is germane to the analysis. Those who forget are likely to fall into the trap of the "sunk cost fallacy." Suppose, for example, that the existing equipment has not reached the end of its life and the investment in it has not yet been fully recovered. Should the unrecovered amount be added to the cost of proposed new equipment in obtaining a capital cost figure for the replacement? The answer is no. Decisions on future operations should not be distorted by any desire to recapture sunk costs, since nothing can be done about the past. The capital cost of the replacement alternative is its first cost less the amount realized by disposing of the existing equipment; the capital cost of the retention alternative is its value plus any expenditures for repair or overhaul needed to continue it in operation. But what is the value of the retained equipment? Book value? Trade-in value? Scrap value? Following the rule of seeking to get the most out of each course of action, the value should be the highest one actually *realizable* at the time of decision is to be made. Book value would not be used, since it represents the effect of a past decision which cannot be altered (the cost of the equip-

ment is "sunk") and it may or may not be a value which can be realized.

Some apparent valuation problems really are not problems at all so far as equipment analysis is concerned, but are accounting problems. If the life and/or residual value of equipment has been miscalculated and its realizable value is less than its depreciated value on the books, past profits have been overstated and the book value of the equipment should be written down, but this process has nothing to do with the equipment analysis. All that the accountant does is not a matter of indifference for the equipment analyst, since the accountant is a source of information, but what he does in recording the history of the firm's transactions should not be allowed to affect analyses dealing solely with the future.

Setting residual values is troublesome because of the uncertainty which attaches to them. The temptation is strong to disregard residual values on the presumption that they are too small and too far distant in time to be reliably estimated or to have much influence on the investment decision and that neglecting them is conservative, anyway. For many types of equipment, however, end-of-life values are an appreciable percentage of original values and net investment may be badly misstated if they are omitted. If there are only small differences among alternatives, if allowable rates of return are low, or if equipment lives are short, estimation of residual value assumes considerable importance and should be done carefully, using the same sources of information employed in determining equipment lives.

Interest and Uncertainty

In each of the formulae given earlier in the article, an interest term figures prominently. The theoretical basis for its inclusion, while sound, is not always fully understood and some analysts erroneously regard interest as a cost to be included only when the funds to be invested in equipment are borrowed. Properly, for the purposes of equipment analysis interest should be viewed as opportunity cost, a measure of what must be given up if the alternative under scrutiny is elected. Whatever the source of funds, they are not costless. If borrowed, their cost is the difference between the position of the enterprise if it borrows them and if it does not. If internally originated, their cost for alternative X is their return in Y, their best other use. At the least, for example, available funds which can be put into equipment also can be put into government bonds, so making equipment investments which can not earn this much means settling for less than the maximum profit position open to the enterprise. (In the case of interdependent investments of course, it may not be possible to show that some one component meets the test, although the whole complex does; this should not give pause, however, for it merely indicates that the feasible unit of analysis must include more than the one component.) In short, the inclusion of interest in equipment calculations is to assure that profit is maximized, at least relatively, by assuring that the full cost of capital is recognized in every proposed application.

SAYING that some interest rate must be chosen does not close the matter by far. About the only brief guidance that can be offered in respect to selection of a specific rate, however, is to suggest that it be realistic and that the effect of the proposed course of action be taken into account in it; one thing which may be overlooked is that making the investment which is under examination may alter the applicable interest rate by changing the credit, capital, or earning position of the enterprise. Typically there will be a spread among the rates at which a company can invest its money internally or externally and can borrow money or increase its capital, so that if company funds are to be used for purchase of equipment, there is a choice to be made and there is no open-and-shut case to be made for any one of the rates unless there is but a single possible source of funds. Use of high rates is conservative—some companies in fact use a "target" earning rate higher than the company's over-all earning rate—in the sense that potential return on investments must be high if they are used, but the higher the interest rate is pushed, the less the chance that any investment opportunity will be exploited. That such conservatism may be self-defeating in passing up good opportunities for superb ones which never come is limpidly clear.

As long as the consequences of selecting a particular interest rate are understood, the choice provides a convenient point for insertion of administrative judgment and is not arguable. In a restricted sense, selection of interest rates to be used in computing costs or present worths of alternatives also can be interpreted as recognition of the degrees of uncertainty inherent in the proposals. In all that has gone before, single valued data and outcomes have been presumed; e.g., operating cost has been taken to be an unvarying dollar amount per period, equipment life a determinate number of periods, residual value a fixed amount, and the outcome, consequently, an unequivocal dollar, time, or rate of return figure for each alternative. Actually the numerical data used more often than not are representations of probability distributions, estimates of control values of ranges within which predicted values—say for operating costs—are likely to lie. Since uncertainty increases with time, use of a high interest rate which builds into the analysis a bias against alternatives requiring large capital outlays and long recovery periods can serve as a rough correction. The correction, however, is one which modifies uncertain values by discounting them, a quite different thing than attempting to ascertain the shapes of their probability distributions or their mathematical expectations for given distributions. For this reason, interest rates in equipment analyses must be regarded in most cases more as criteria derived for administrative judgment than data to be determined. A preferable practice is to separate factors intended to compensate for uncertainty from the interest rate intended to measure capital cost to avoid mixing up criteria with data in analysis and to allow identification of the effect of various assumptions regarding risk.

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Conclusion: Why Analyze Quantitatively?

These remarks do not pretend to be exhaustive catalog of pitfalls; some of the more glaring errors which may be committed in quantitative economic analysis for equipment decisions have not even been mentioned here. Because the purpose has been to focus on some fundamentals which often are not appreciated, no attention has been given to such flagrant missteps as comparing alternatives on different bases of output, hinging decisions on unit costs or unit profits without reference to volume, or making illogical or inconsistent assign-

(*Continued on page* 31)

Line-Staff Revisited

by J. Rich Johnson
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Ohio State University
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IF you and your wife had discussed "Which of us is line, and which of us is staff?" during the first year of your marriage you probably wouldn't have entered into the second year of your marriage.

Discussions of this subject are taking place in business these days and are being found exceedingly painful.

There is good reason for conflict in the actual practice of line-staff relationships. Probably the main reason is the fact that line-staff has been looked at by most companies from the jet plane of theory and platitude. Pathetically few companies have come down from cloud eighteen and actually walked over the ground of their own situations and their own needs.

This close look at the detail of your own organizations—a "revisiting" of the line-staff—is essential if any part of it is to be practiced effectively, and may disclose the following points:

1. *Organization structure is a study of relationships among functions. These functions have varying degrees of responsibility.*
2. *Because there are varying degrees of responsibility placed in many parts of the organization, it is almost impossible to classify all jobs either "line" or "staff." Further, attempting this classification is impractical, time wasting and harmful.*
   Going back to the couple who had been married less than a year, we can see that discussion of function and responsibility is important—"While you are getting the car greased, I'll buy the groceries." But trying to classify this work as either line or staff would be ridiculous.
   Any effort to force all people in a plant into the line-staff dichotomy is no more proper than classifying all the world's people as either "tall" or "short"; there are just too many "in betweens" for a realistic two-part breakdown.
3. *A close look at your present structure may change your thinking about not tolerating different kinds of structure within a given company. Many medium-sized organizations have different needs at different levels of the company and therefore can effectively and harmoniously adapt line-staff, functional and straight line structures within one company.*
4. *The close look may show us that we have relied too heavily on "principles" of organization structure. We have assumed that they will do our thinking for us. We tend to overlook the fact that some of these principles conflict with each other and require our judgment and decision to settle the conflict. For example, a narrow span of control would lead to a "deep" structure. Conflicting with this is the thought concerning "fewest possible levels" which would lead to a shallow structure. Obviously we can't have both. We must think through a compromise for ourselves.*
   People have often told me "I have applied every principle in the book and my structure isn't working." Obviously, if a man applied every principle in the book, his structure couldn't be working.

A close look at line-staff shows that there is no substitute for realistic evaluation of our own situation and the use of good judgment in establishing structure that best fits our needs. Let's take a closer look at some of the points that emerge in revisiting "line-staff."

Line-Staff Is Not a Cause But an Effect

Starting at the beginning, the owner of one-man business hires his first employee. At this point he must first con-

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sider: 1) What work the man must do; 2) What responsibility and authority the man must have.

After a while, he has hired a hundred or a thousand men. He is faced with the same problem of functions and responsibility each time he hires a new person.

One factor normally guides him: He usually *places authority with work that will most directly accomplish the goals of his business.* This work is normally associated with the product the customer buys. The functions that usually affect the customer most directly are production, sales and finance.

Because of this, those three functions have become the classic "Big Three." Most businesses and books refer to them as the "line" functions.

At this point, we have the "effect" of line—or line and staff—but we must recognize that they came from the very basic question: "To what function shall I delegate responsibility to best accomplish our company goals?"

Line and staff, therefore, are not a matter of rule; they are a matter of best judgment in a situation where delegation is called for.

Responsibility and Authority Are Given to the Work — Not the Man

The primary question is not line and staff, it is a matter of *who* has *what* authority.

The question of delegation of authority is one that must be considered with the greatest of care. On one hand, enough authority must be delegated to assure the end result that we hold a certain function responsible for.

On the other hand, it is normal to want *more than enough* authority. In some cases, delegating authority can be confusing or downright harmful. More jobs than we would like to believe can be accomplished without authority.

For example, consider personnel. One of their functions is to make sure the company abides by all laws concerning employees. They require, and have received, the authority necessary to keep each department functioning in a legal manner.

By contrast, personnel does certain training work. In this case, authority would be confusing; the student would then have two bosses, his instructor and his superior. Or it could be harmful. We are not trained—we do not learn—by being "ordered" to learn.

Authority to stimulate learning would be indicative of poor management, poor employees and poor instructors. So there are certain places in the company where authority is required and there are other places where it is not.

Authority is not delegated personally; it is given in the same manner as milling machines and typewriters—it is distributed in the way that will most effectively get out the work.

The Effect of Growth on Authority, Line and Staff

A company never stands still. It is either advancing or retreating. As it advances, the work of one man is divided between two or more. If it retreats, the work of two or more men is handled by one [or less].

This leads to an interesting and realistic view of authority or "line and staff." As a company advances or retreats, a man's job may be composed of a differing number of tasks. Some of these tasks, because they are felt to be important by the man who delegates authority, are given authority to command. Other tasks, because of their lesser importance—or because authority would be harmful—are not given power to command.

Because of this, it is common for one man to wear several hats. If the controller advises about improved control systems, both he and the man he is advising recognize that the power to command is not required. By contrast, if the controller approves budgets the men involved recognize a "command" situation. Control of the company's finances is vital to its survival. Because of its importance, a number of companies feel command authority is necessary for a controller to carry out his function.

Work	Control Systems	Budget
Authority	Non-Command	Command

Of course, command and non-command are not absolutes. There are degrees of authority that may be given to any part of a job. The controller might have command power at levels beneath his own. But on his own level, a disagreement may or may not call for arbitration by the superior of the men involved. So, compounding the problem of command and non-command are the *degrees* of authority delegated by a superior.

If we recognize that a company is constantly in motion, we can see why an arbitrary line-staff division is difficult to maintain. It is more common for one job to be part command and part non-command.

Let's take a bird's eye view of a typical middle-sized company. (Figure 1)

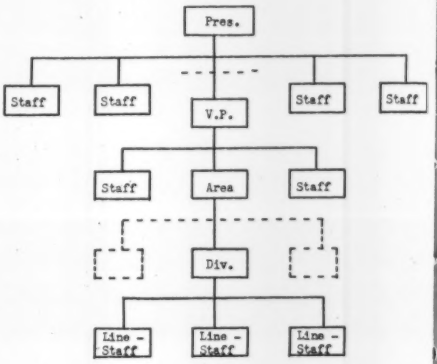

Figure 1

There are vastly different needs in different parts of the company. From one point of view (which I readily grant is not totally accurate) we are looking at at least three separate organizations. One reports directly to the president, the second to the "line" vice president and the third to a division manager responsible for a state or territory.

Let's look at them one at a time.

The president is responsible for the "parent" organization. The mission of his organization is the investment of funds for the betterment of the total company (Figure 2).

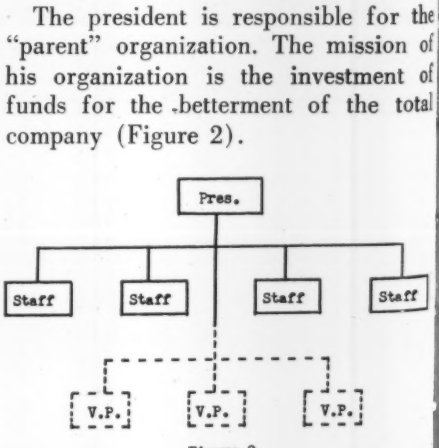

Figure 2

The men not directly in the "line" in the top two groups are only responsible for advising their superior. They are not responsible for running organiza-

PERSONNEL

Work	Hiring	Training	Wage & Hour	Benefits
Authority	Non-Command	Non-Command	Command	Non-Command

tions of any size and they are not responsible for making overall decisions—their superiors do that. The first and third groups are highly centralized. The second group is mainly decentralized.

Men reporting to the president and to the division manager are divided by function—work to be done—legal and personnel are examples.

Also reporting to the president, but definitely not a part of the same problem, are various subsidiary organizations. One of these is headed by a "line" vice president (Figure 3).

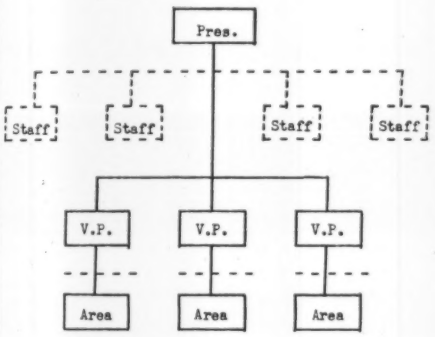

Figure 3

The mission of the line vice president differs from that of the top group. He is primarily responsible for supplying the top group with investment funds. In addition, he is responsible for the equitable administration of company policy to assure maximum production and for the establishment of a skilled and economical work group.

Men reporting to the line vice president are divided partly by work function (public relations, research, product design) but predominantly by the *management* functions of planning, directing and controlling. The men responsible for the management functions are the area and division managers. Their work requires them not to be specialists in work such as sales, but to be specialists in the work of managing. This middle group is primarily line and staff.

The third component is the division—one of a series of reasonably self-sufficient sales, production and service centers (Figure 4).

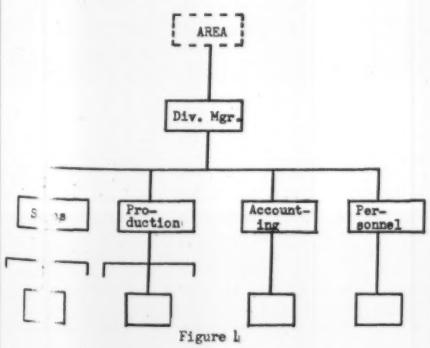

Figure 4

Quite commonly *all* men reporting to the division managers have divided responsibilities. They are responsible for their own operative areas—for example, sales, production and accounting—and, in addition, they act as advisers to their division manager. In some cases their superior makes decisions, but in many he merely furthers or coordinates the decisions of the men reporting to him. This third group is functional, but with a heavy leaning toward "line."

There are obviously other differences but those are not pertinent, as I see them, to the issue at hand.

The problem, then, becomes at least four separate problems. These would be:

1. *To accomplish the mission of the "parent" company, precisely what authority must the president delegate to each man reporting to him?*
2. *What authority must the line vice president delegate to the men reporting to him so that his responsibilities can best me met?*

(Continued on page 31)

Beginners, Butterflies and Blueprints

MUCH has been written about the 'first step,' the 'first tooth,' the 'first date' and the 'first kiss.' There is still another 'first' however, equally important, that has not been so well publicized, 'the first day on the first job.'

Those of us who are definitely settled in our life's work are prone to forget our own tremulous beginnings. Think back, if you can, to *your* first day on your first job . . . remember leaving home on that all-important morning? The family's well wishes rang in your ears: "Don't worry, they won't give you anything to do that you can't handle!" "So and So got a job, and he's not a bit smarter than you." "A year from now you'll laugh about it." etc.

Remember, too, how you eyed all those you met on the street, envying their apparent light-heartedness and wishing mightily that this was the third or fourth day. Yes, even the second! Your hands were sweaty and the butterflies in your stomach felt like eagles. In desperation you tried to remember some of the things you were supposed to have learned in school. Were you really entitled to that new, shiny diploma? You began to wonder. Suddenly you understood why some people never worked—they were afraid of that *first day!*

How your transportation, that usually took an eternity to go a few blocks, whisked you across town in a matter of half-seconds! Mile-a-minute questions raced through your mind. . . . Will I be the only new one today? Will I know anybody? Should I keep quiet and be as inconspicuous as possible or would it be better to bluff it out as though I knew what it was all about?

Then, the awful moment when you actually approached your target, the place where you were going to work! The wild, sinking feeling of paralysis that seized you as you stared at the forbidding-looking building. You stopped to tighten a shoelace that wasn't loose. Then you stooped over, in a poorly executed gesture of nonchalance, to read a fragment of newspaper lying on the sidewalk. When you straightened up, you couldn't remember a single word you had read. In spite of your deliberate, delaying actions, you suddenly found yourself drawn by some irresistible force toward the Door of Doom! Trance-like, you walked in. . . .

Lest our reminiscing tend to discourage young job seekers, it might be well to forget our past and concentrate on their present. The modern factory is no longer an inspiration for a horror story. Beginners are not shackled to their machines, nor are they subject to periodic tongue lashings by scowling slave drivers. On the contrary, graduates who have managed to acquire a suitable groundwork, are much in demand. Even those who bring little or nothing in the way of special knowledge or talent are welcomed with opportunities un-heard of in the past.

Under the old order, new 'hires' were frequently placed in the charge of persons ill-fitted for the job of teaching. More often than not, the beginner's teacher was chosen by impulse, the foreman's impulse "Here Mac, give this guy the lowdown." Whether or not Mac was actually qualified to instruct others, was of no consequence. The 'so what' attitude reflected a general air of dis-interest and resulted in a haphazard method of teaching new employees.

Not so today. Once hired, newcomers are given every consideration. Their potential is acknowledged, and as a result, they are expertly trained by carefully selected personnel. The beginner today is recognized as an investment which, if cared for properly, will return substantial and consistent dividends to himself as well as his employer.

That being the case, 'the first day on the first job' should hold no terror for the new employee. Rather, it should be recognized as another of Life's important milestones—one that could well mark the beginning of a happy and successful career. ■

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What Makes People Cooperative

by Dr. W. C. Schwarzbek
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FOR some time we in General Electric have been very much interested in the question of what makes people cooperative. For example, we have done many things that reflect an interest in our employees; and we are continuing our search for better ways to contribute to their welfare. Particularly we would like to know more about the way in which the full creative potential of people can be released and joined together in a common purpose.

I will attempt to spend most of the time allotted to me in telling you about some of our experiences with attitude surveys as they relate to this matter of understanding people better and finding out what can be done to win their cooperation. However, before I turn to the subject of attitude surveys, I would like to take a little time to build a more general background in such a way as to provide a broad setting for what I have to say later.

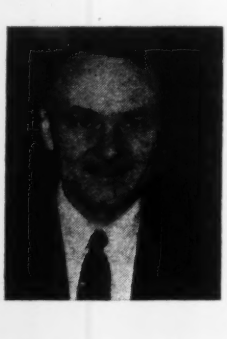
I am sure many of you are familiar with the work and the thinking of L. R. Boulware, Vice President, Public and Employee Relations, in General Electric.* Over the past 10 years or so, he has given leadership for the development of a broad philosophy, which has been both useful and challenging for all of us working in the functional field of Public and Employee Relations.

A business, Mr. Boulware points out, is a kind of clearinghouse, in which managers bring people together for the purpose of making and selling goods and rendering services. The people who are brought together form groups having different but interdependent roles. There are the customers, who purchase the goods and services, and whose payments are the continuing source of income for the business. There are the shareowners, who supply the tools, equipment, and facilities, in turn for which they are paid dividends. There are the employees, who contribute all of the varying kinds of work that go into the designing, making, and selling of products and services, and for which they receive wages and salaries. There are the suppliers and vendors, from whom raw materials, tools, and supplies are purchased, as well as the distributors, dealers, and contractors. And finally, there is the large group known as the public, which we generally think of as being represented by various agencies—in particular, city, local, state, and federal governments.

The task of management in dealing with all of these various groups who both contribute to, and have a claim upon, a business is essentially that of *pleasing people.* And it may be worth noting here that there is considerable variation in the skillfulness with which certain groups of management are able to perform this task. It is probably true that the art of *pleasing customers,* for example, is more highly developed than that of *pleasing employees.*

It is also part of our General Electric thinking that in order to please people it is necessary for management to serve the best balanced interests of all of these contributor-claimants—the vendors, shareowners, customers, employees, and the general public (and its representative, government). Essentially this means that it is management's job to determine what is the right and proper share of each of the contributor-claimants, based on his contribution and on

* *Boulware, L. R., WHY AND HOW GENERAL ELECTRIC IS INTEGRATING PUBLIC AND EMPLOYEE RELATIONS—A paper presented before the American Management Association, Colgate University, July 23, 1956.*



Dr. Schwarzbek has been with General Electric since 1946 in various phases of employee relations work. Prior to this time he spent four years on active duty with the U. S. Navy. From 1936-42 he was Assistant Professor of Psychology at Wittenberg College in Springfield, Ohio. Dr. Schwarzbek received his Ph. D. from Ohio State University in 1935. He is a member of the American Psychological Association and the American Association of the Advancement of Science.

the total return that is available at the time.

There are at least two factors that play a very important part in pleasing people and that need to be taken into consideration by management.

The first of these has to do with the nature of the human being and what is necessary to satisfy him. The mistake has often been made of assuming that the only returns people are looking for are those in the financial or material realm. Of course, it must be admitted that the basic physical and economic interests are very insistent and tend to become dominant whenever there is only enough available to meet the bare necessities. However, in a period of abundance, such as the one we are in now, where so many of the basic economic needs are well satisfied, other types of human needs become dominant. These needs we think of as being in the psychological, social, and spiritual realm. In the psychological realm, for example, there are such things as pride in workmanship, desire to exercise creative capacity, and a sense of inner security. In the social realm there are such things as a desire for pleasant and interesting associations with others, constructive relationships between boss and employee; and in the spiritual realm, such things as the desire to see principles of honesty, charity, and freedom prevail.

IT is particularly worth noting that management may fail in its task of pleasing people, because it does not do a good job in the material realm; but it is becoming increasingly apparent that even when management is satisfying the economic wants of people, they may still fail in their overall mission. It is for this reason that the extra effort to please people in the psychological and spiritual realms may well be the most important determiner of management's overall success in running the business.

The second consideration in pleasing people is the realization that what people need or think they need, and what they think of as being their fair share of the returns from a business, may be in excess of what is actually available. Thus, it sometimes happens, for example, that the customer thinks he should pay only $1 for the product that is actually worth $2. Similarly, employees sometimes feel that they should have $2 in pay for work that is worth only $1. To be successful under these circumstances, it is important for management not to lose the customer, nor to have the employee quit, nor to have the shareowner sell his interest in the business. Rather the task is to persuade these people that what is being offered them is their proper and fair share in relation to what is in the best balanced interests of all of those who contribute to, and have a claim upon, the business. This again involves an appeal to those psychological and spiritual values mentioned before. In great measure it rests upon management's willingness, first of all, to do what is right; and secondly, it rests on management's ability to give the people an understanding of the true nature of the business and of the economic facts which underlie it.

Let us now focus our attention more sharply to one of the contributor-claimants: namely, the employee; and let us try to determine in what ways the attitude-survey techniques help in the important task of pleasing these people.

The Attitude Survey as a Tool for the Manager

Our survey was conceived and developed as a tool for operating management. Several implications grow out of this fact. The characteristics of the survey itself, and certainly the underlying principles and procedures, are influenced significantly when managers use the survey as a tool to help them do better their job of managing.

Perhaps the first factor deserving notice is the manager's own emotional responses to the survey. In a very real sense he allows himself to become a target for critical as well as laudatory comments from his employees. Under such circumstances it is quite easy for him to feel that his own security is threatened. He will naturally try to learn beforehand about survey procedures; and, in particular, he will try to anticipate how the outcome may affect him personally. It is important that sufficient time be allowed for these attitude adjustments to take place before the questionnaires are administered, because this is the only way in which the manager's fears and defensiveness can be overcome —a step which must be taken before the survey can become a helpful tool to him. In the final analysis, the real value lies in the fact that the manager accepts the survey as a tool that will help him become a better manager.

In the second place, the survey is a method whereby the manager can increase his knowledge and understanding of the attitudes—the likes and dislikes—of his employees. A brief standardized questionnaire is used to record these attitudes.

The knowledge about people's attitudes derived from surveys is of a different sort than the information that comes to the manager in his day-to-day experiences—such casual conversations, reports about stress situations, appeals for hearings on grievances, etc. Survey knowledge comes from systematically gathering opinions from *all* of the people in an organization under controlled conditions. Furthermore, it describes a group rather than individuals; and it does this in quantitative or statistical terms.

IT is also important for the manager to realize that the attitudes and opinions of employees as recorded in a survey may not reflect conditions as they actually are. The important thing is that the survey reflects what people *believe* are actual conditions. These beliefs are the realities with which a manager must deal, whether they are founded on fact or on fancy.

Third, the time required and the cost of conducting surveys are of great importance. When the cost is high, compared to the amount of information obtained, most managers will be slow in accepting the survey as a standard procedure suitable for regular and repeated application. Furthermore, if the survey involves complicated scheduling or requires large amounts of time, there will be a tendency to occupy the managers in these administrative matters, rather than to obtain their full attention on the important matter of interpreting results and planning and carrying out follow-up action where it is needed. The use of a short standard questionnaire administered to all the people in an organization has helped achieve the necessary economies in time as well as cost.

In the fourth place, certain techniques and procedures are significant when using the survey as a management tool.

One of these procedures is concerned with the grouping of employees for the purpose of administering the survey and also of analyzing and interpreting the results. The employees within a given component, plant, or office, are sub-divided into groups according to organizational lines. In this way each manager, supervisor, and foreman, gets a reading on the attitudes of those reporting directly to him. This accomplishes two purposes: It locates those areas within the organization that have significantly

higher or lower attitudes than the average; and, by placing this information into the hands of those managers who are closest to the situation, it decentralizes the decision-making and the follow-up action.

Another aspect of the procedure is the manner in which the nature and purposes of the survey are explained to participating employees. In essence, this consists of pointing out that knowledge of what employees like and dislike about their work helps managers do a better job in running a successful business. Although employees may be led to expect direct personal benefits from the survey, this is *not* presented to them as the primary purpose. We have found credibility and cooperativeness *greater* when management frankly and openly emphasizes the primacy of the Company's interests over the employees' interests. We feel that this fact, too, has considerable significance when it comes to pleasing people.

Structure of Survey Questionnaire

The items on the standard questionnaire are simple declarative statements, such as: "Temperature and ventilation are good in my work place;" "The work runs smoothly here;" "All in all, I am satisfied with my pay." The employee records his answers to show how much he agrees or disagrees with the statement. The entire questionnaire contains 40 items.

The questionnaire has been systematically designed to be broad in scope and deep in penetration. It was developed so as to cover all significant attitude areas. In order to do this, we carried out many interviews with employees and managers, as well as professional social scientists. From these we obtained a large list of items. We then administered this list of questions to several hundred employees and subjected their *answers* to a statistical analysis, which eliminated the many duplications and left us with a small number of items classified according to the major attitude areas found in employees.

This same analysis also gave us a structured questionnaire. That is to say, it set forth all of the significant broad attitude areas, each of which is relatively unique and has a minimum of overlap with any of the others. We found eight such somewhat separate and distinct areas. We selected five items to measure each, thus accounting for the 40-item questionnaire. Each group of five items is called a category. A typical category—Working Conditions, say—is composed as follows:

"Temperature and ventilation are good in my work place."

"The layout of space and facilities is convenient."

"It's too crowded in my work place."

"Our work area is kept neat and clean."

"It's too noisy in my work place."

The following is a list of all the eight categories:

1. Communication
2. Working Conditions
3. Operating Efficiency
4. Compensation
5. Group Harmony
6. Future Opportunity
7. Supervision
8. General Management

The questionnaire for exempt employees contains an additional fifteen items grouped into three extra categories as shown below:

1. Orientation
2. Worthwhileness
3. Work Pressure

The questionnaires are scored and tabulated on electronic computers, using punched cards. A single figure represents the attitude expressed on each item for each group of employees covered in the survey. This single figure is the percentage of people in the group giving a "favorable" answer to the question. A "favorable" answer consists of the "agree" responses to the positively stated items; and the "disagree" responses to negatively worded items.

Scores for all the groups in the organization, or for various combinations of groups are consolidated to show summarized results.

Summarizing Data

Provide a very broad summary of the entire survey for the manager to show how the hourly, the non-exempt and the exempt salaried employees in his plant compare with each other and similar groups in other plants. Give this information for each of the attitude areas or categories.

Similar charts are constructed to give a more detailed analysis by showing the scores for each of the individual questions making up a category. A complete portrayal of all results on the forty individual items of the questionnaire thus comprise eight such charts—one for each category.

Show the category scores for all of the various groups within the organization and reveals at a glance the relative standing of each group in each category.

Actual data from one of our studies discloses two important general facts. The first is that the group with the highest average for the entire questionnaire does not necessarily have scores above the other groups in all of the categories; nor does the group with the lowest questionnaire average necessarily have the lowest scores in all of its categories. The second is the *wide range of differences* between the *highest* and the *lowest* groups for any category.

It is more or less standard practice to begin interpreting such summarized survey results by identifying the high and low groups and categories. Succeeding steps of such a diagnostic procedure consist of a more detailed examination of all the available survey data covering scores on individual questions, especially for those groups with unusually high or low category scores.

Interpretation and Use of Results

Surveys do not provide ready-make guides to action. Diagnosis and interpretation are essential steps to obtain a fuller understanding of the groups in an organization. With enlarged understanding better decisions and more constructive action can follow.

The task of interpreting survey results is essentially the manager's responsibility—notwithstanding help he may receive from survey "experts". In fact, *each* manager throughout the organization needs to share in this task. The survey provides a summary of attitudes for each component; and the manager of each of these components is in the best position to answer the basic questions: "What do these results mean?" and "What should I do about it?"

Such interpretation makes use of any other available information about the various groups by relating it to the survey data. This might include such items as the composition of the group as to sex, age, length of service of employees, etc., and information about work-load fluctuations, or any other types of changes in schedules, methods, organization, etc., in the group. Performance and behavior records of various kinds, such as output, quality, accidents, grievances, turnover, etc. in the group are often clues that round out the meaning of survey results.

We have a great deal of testimony from our operating people that the standardized attitude survey, when applied as a diagnostic tool, proves very useful. It helps them get a better under-

standing of their people, and it is useful as a means of motivating them. There is also evidence that the sheer act of participation in a survey is satisfying to employees and gives them a better job outlook. It's another indication to employees that management is mindful of them; and we have known, at least as far back as the days of the Hawthorne studies, that performance and attitudes both are improved when management pays attention to the employees.

Are Attitudes Related to Performance?

However, there remain a number of unanswered questions about the survey technique. Perhaps one of the broadest and most typical statements of what I have in mind is revealed in this question from a manager. He said: "How can I be sure that the comparatively high satisfaction level shown by this particular survey indicates a basic cooperative spirit and willingness to put forth good effort rather than merely a complacency among the people in the group?" This statement is representative of many questions that are asked about the connection between attitudes and work performance. Is there a connection between people's attitudes and the way they perform their work.

In asking this question, the manager was not unmindful of the many practical benefits he had already obtained from his survey in the form of a better understanding of his employees. He appreciated the way the survey confirmed some tentative diagnoses he had previously made on the basis of other information, and he also valued the fact that where survey results seemed to conflict with other kinds of evidence he obtained useful guidance in deciding when and how to seek further until he obtained an answer he could accept with certainty. What he really seemed to be asking was whether some general rules have emerged that describe how attitudes are related to other characteristics of work groups such as, the kind of work done, the type of plant and community environment, the kinds of people in the group, the methods and policies of management, the amount and quality of work done, and so on.

Studies on these kinds of problems are far from complete and time does not permit presenting more than a brief sampling of some of our results so far. However, the following general statements will serve to show the direction in which these findings are pointing and they may illustrate what seems to be a very promising area of study:

—Average favorableness of salaried employees is greater than that of hourly employees.

—There is only a very small difference in averages between exempt salaried and non-exempt salaried employees.

—Exempt salaried employees in various functions, such as engineering, marketing, manufacturing, finance, showed no attitude differences on the average.

—Whereas, average differences between various kinds of employees mentioned above are generally quite small; there is a *large* range of differences among the groups within a plant, regardless of kinds of employees.

—In one plant, one group of hourly employees doing light conveyorized assembly work and earning about 25 per cent above the incentive base were more favorable in some attitude areas than a group similar in all respects except their earnings averaged only about 0 to 5 per cent above the incentive base. The former were more favorable regarding attitudes toward supervision, toward associates (Group Harmony), and toward operating efficiency; but there were no differences between the two groups regarding attitudes toward pay, future opportunity, or working conditions.

—In another plant, two groups of engineers doing similar work, but differing in the performance appraisal management made of them, were compared. The higher rated group was more favorable in attitudes toward pay and future opportunity, but there were no differences in the other attitude areas.

Our data are not extensive enough to provide explanations for all these findings. They do demonstrate, however, that there are attitude differences associated with certain performance differences, but that this is not a simple relationship. From this it follows that no completely general rules are available, for the present at least, as guides for the interpretation of survey results. However, those general principles that are available, when combined with the diagnostic method described earlier, provide a way for dealing with each unique group of employees on an individual basis.

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Now let us consider what role attitude surveys may play in winning the cooperation of employees.

Our experience has shown that an overwhelming majority of the employees interpret the survey as a manifestation of management's *interest in them.* It shows them that they are being appreciated as important contributors to the success of the operation.

In this connection it is worth recalling our earlier observation that the better procedure proved to be the one in which the purposes of the survey were stated so as to place primary emphasis on the welfare of the business rather than on the personal satisfaction of the employees. This fact shows that employees do not resent it when management puts the best interests of the business first. Rather they expect it.

However, it does not necessarily follow that employees will automatically remain cooperative, especially if they come to believe that their own interests are unfairly subordinated to the welfare of the business. Therefore, it is highly important to take steps to point out and keep on emphasizing that in the long run there is a large area of common interest between a business and its employees; and that personal satisfaction

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can come from being identified with a successful business as well as from getting the direct material rewards.

I believe that there is a tremendous opportunity in these areas for management to win people's cooperation by providing these *extra* psychological and spiritual satisfactions to employees. First, by assuming and acting as if the employee were capable of being interested in the business and not only in fulfilling their own personal desires; second, by giving serious and continuous attention and study in order to determine what is *right* and *fair* to all those who have an interest in the business, and then vigorously and voluntarily doing what is right; third, by explaining and interpreting the business to the people, so that everyone may know not only what the basis is for the rewards he gets, but also what he himself can do so that his efforts will contribute most toward the success of the business.

How to Interpret Business

Our experience shows that interpreting a business to employees is a continuing task requiring day-to-day attention. Furthermore, if employees are to get a consistent concept of the business, so that they may genuinely understand and feel their personal role in it, then the task of interpreting is one for all managers, not only the general manager.

Our attitude-survey results contain some suggestions regarding the *manner* and *approach* by which managers may carry on these communication activities.

In some of our questionnaires we inserted two items in addition to the 40 standard ones already mentioned. The wording of these questions is as follows:

Item S: SUPERVISOR STOPS TO TALK

> During the past week how many times has your supervisor stopped by to talk to you individually about your job and your work?

Item E: EMPLOYEE GOES TO SUPERVISOR

> During the past week how many times have you gone to your supervisor to talk about your work or to ask questions about your job?

We then classified employees into groups according to the way they answered these questions ("none," "once," or "more than once") and then tabulated and compared the attitudes of these groups as measured on the standard 40 questions.

Employees who report more frequent contacts by their supervisor generally have more favorable attitudes than do those who say their supervisor did not stop to talk to them. Also employees who reported going to their supervisor more often had more favorable general attitudes than did those who reported making no contact with him.

Do these results mean that attitudes will be progressively more favorable if employees note a larger amount of communication between themselves and their supervisor, regardless of who initiates the contact? We obtained information bearing on this question by making still another tabulation—this time by making four groupings of employees according to the way they answered *both* of these questions.

Group 1 contained those who said they made no contact with their supervisor, nor he with them. This represents the least communication. Group 2 contained those who said they made contact with their supervisor, but that he did not come to them—a moderate amount of communication. Group 3 contained those who said they did not go to their supervisor but that he had made contact with them—also a moderate amount of communication; and Group 4 contained those who reported going to their supervisor and also his coming to them—the most communication.

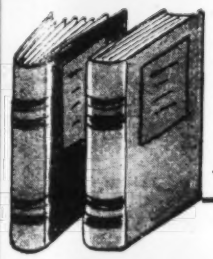
If it is true that a greater *quantity* of communication is associated with more favorable attitudes, we would expect Group 1 to have the least favorable attitudes, and Group 4 the most favorable. Attitudes of Groups 2 and 3 would be about equal, and intermediate between Groups 1 and 4.

However, this was not the result we obtained. Instead, the data showed essentially two things: 1) Attitudes are always better in those groups where the employees report that the supervisor is the one who initiates the communication. When the supervisor initiates the communication it does not seem to make much difference whether the employees themselves also go to the supervisor or not. 2) When the supervisor is not seen as the one carrying communication to the employees, then the attitudes are less favorable and they are *markedly less favorable when the employees themselves take steps to initiate the communication—but where the supervisor does nothing.*

The interpretation we suggest is that the leadership role of the supervisor is more important than is the sheer volume of communication. It is not enough to wait until employees ask; these results suggest that communication, to be effective, must be given direction and carried to the employees.

THIS fits in with what we know about pleasing people. People are more likely to be kindly disposed if, from the beginning, they are given a clear picture of the position of the person who would persuade them—in this case their manager or supervisor. In this way employees may understand and become accustomed to their economic role in the business and appreciate the connection this has with their own interests. The risk of creating dissatisfaction by simply making no effort to clarify people's roles in an undertaking is considerable. It is almost certain that, if a manager does nothing to clarify his employees' economic role in the business until they themselves take the initiative to seek clarification by asking questions, it is too late. By that time it is highly probable that the dissatisfaction has already occurred.

Thus, pleasing people—winning their cooperation — cannot be taken for granted. It is a continuing task requiring an active and positive approach.



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HUMAN UNDERSTANDING IN INDUSTRY — A GUIDE FOR SUPERVISORS

By William C. Menninger, M.D. and Harry Levinson, Ph.D. Published by Science Research Associates, 57 West Grand Ave., Chicago, 10. 102 pages $2.25. Orders of 25 or over $1.75. LEADERS GUIDE, 26 pages $0.50. Same authors and publishers. One supplied with orders of ten books.

EVER since the pioneer days of Scientific Management there has been a strong feeling that psychiatry could be of great help in solving problems in industry that involve people. Frank Gilbreth took a list of human relations problems to his friend Dr. Ernest Southard of Boston, an outstanding psychiatrist of his day. He located hospitalized patients whose condition had been caused by emotional problems in their industrial life and helped his engineer friend to understand causes and to look for ways of preventing difficulties.

Undoubtedly since that time there has been cooperation between management engineers and psychiatrists, but accounts of the projects involved have not been available to the general reader, or even to the seeker for knowledge eager to work in this field. The few psychiatrists who have spent full time in this field in industry have been too busy to speak at conferences of management people or if they did speak they have used such technical terminology that they were not easily understood by "laymen."

During the last few years the Menninger Foundation of Topeka, Kansas, has not only developed interest in this field but ways of meeting the needs. The writers of the texts here reviewed are not only authorities but possess the rare gifts of knowing what they are talking about and saying it in a way that is easily understood, interesting, practical and stimulating.

This "Guide for Supervisors" is called a handbook, but it has none of the characteristics of the heavy handbook as Industry knows it. Instead it is light in the hand and, while it is serious in purpose, presents its material with a light touch. There is a short preface in which the authors explain that they are not trying to give all the answers to human problems but rather presenting a point of view that they hope will lead to a better understanding of people and what makes them act in the way they do. A note says that the book is designed to be a help in developing or expanding training programs. It is a book that helps one to locate and state problems and indicates methods of solving them without trying to prescribe step by step solutions. It seems to aim to make better supervisors as well as better supervision.

The chapter headings indicate the simplicity and clarity of the material: "You and Your Men," "How Do People Get That Way?," "What Personality Consists of," "How Your Personality Protects Itself," "You, too," "In Conclusion." To the Management man trained to think in terms of the questioning method, and concerned with the *what*, the *why*, the *who*, the *where*, the *when*, and the *how*, this is a type of presentation that he understands and admires.

Each chapter stimulates questions, gives case material, has lively and stimulating illustrations, gives evidence of first hand knowledge of what happens in the factory and why. At the end of the book is a short list of references, "For Further Reading" diversified as to author and field of interest, but all referring to books or articles written during the last 20 years, most of them the last 5 years.

On a first rapid review of the short, unassuming book one is impressed by its readability .It presents situations that come up day in and day out, it has a sense of humor. But a more careful reading impresses one with the soundness and importance of what is said. Here two men

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steeped in the findings of research and application have come to the final stage of wide usefulness where they can tell us, simply and clearly, *what* needs to be done and *why*. One has the feeling that the advice given is based not only on knowledge, but on wisdom, and that the authors have a warm concern for people and want to help people to be the best selves they can be.

The "Leaders Guide" gives suggestions to supplement each chapter of the book, also a reading list and a list of films and film strips. Doubtless later editions will include more material. It is to be hoped that this will include more of the authors' own books and articles, which they have modestly omitted, for these are the most helpful there are in leading one to the rich resources of experience from which these small, helpful pamphlets are derived.

William M. Gilbreth

Management Theory and Practice

A-20 **Management in a Rapidly Changing Economy—Dan H. Fenn.** 351 pp. McGraw-Hill. 1958. $5.00.
A review of new problems and new approaches to management in the U. S. as seen by many leading executives and management authorities. This book is a compilation of the speeches and discussions at the 27th National Business Conference of the Harvard Business School.

A-21 **The Learning Process For Managers—Nathaniel F. Cantor.** 160 pp. Harper. 1958. $3.00.
Considering the key role of the manager as a teacher and guide for those who work under him, this book gives practical advice on psychological factors and techniques of teaching and learning which must be understood if this job is to be done effectively.

A-22 **Management For Engineers—Roger C. Heimer.** 466 pp. McGraw-Hill. 1958. $6.75.
Engineers increasingly find themselves carrying management responsibilities for which their basic training and previous experience provide inadequate guidance. This book is designed to fill this gap in a frame of reference which will be understandable to both student engineers and practicing ones.

Management Tools and Techniques

B-34 **Brainstorming — Charles H. Clark.** 262 pp. Doubleday. 1958. $4.50.
Subtitled "the dynamic new way to create successful ideas" this book explains the basic approach and methods and gives specific examples of the "brainstorming" technique. This carefully planned way of achieving a completely unplanned flow of ideas is receiving increasing attention in management circles.

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B-35 **A Decade of Industrial Relations Research, 1946-1956—Neil W. Chamberlain and others.** 213 pp. Harper. 1958. $3.50.
A summary publication by the Industrial Relations Research Association describing major research findings on all aspects of union-management relationships.

B-36 **Classrooms In the Factories—Harold F. Clark and Harold S. Sloan.** 135 pp. Associated College Presses. 1958. $3.75.
An interesting report on the expanding educational activities which leading American business firms are carrying on for their employees. Covers everything from training of workers at the bench to efforts to raise the caliber of top management through general educational courses in cooperation with universities. Based on a study of the practices of the 500 largest industrial corporations in the U. S.

B-37 **Corporate Public Relations—John W. Hill.** 189 pp. Harper. 1958. $3.50.
Treating public relations in its broadest aspect as one of the major tools of modern management, this book centers on how business can make the most effective use of public relations techniques in communicating with the public and its own employees. Covering such basic fields as public attitudes towards business as a whole and a particular business enterprise; relationships between business and the educational system and special public relations problems in the international sphere, this book shows how far modern public relations has grown in scope and depth from old-fashioned press agentry.

B-38 **Automation—Frederick Pollock.** 276 pp. Praeger. 1957. $5.00.
A thorough study of the economic and social consequences of automation in the U. S. The study was made by a European expert and contains interesting insights on the American scene in this area.

B-39 **Motion and Time Study—Ralph M. Barnes.** 677 pp. Wiley. 1958. $9.25.
The fourth edition of a well known standard book. New chapters give up-to-date information on such new developments as motion study mechanization; electronic data processing; systems of time-motion data; work sampling; the effect of environmental factors; and new wage incentive plans.

B-40 **Basic Motion Timestudy—Gerald B. Bailey and Ralph Presgrave.** 208 pp. McGraw-Hill. 1958. $5.00.
A new basic analysis of the key principles of work measurement and motion identification.

B-41 **The Preparation of Programs for an Electronic Digital Computer — Maurice V. Wilkes and others.** 252 pp. Addison-Wesley. 1958. $7.50.
The second edition of an important work on the mathematical aspects of computer programming.

B-42 **Production Planning and Inventory Control—John F. Magee.** 344 pp. McGraw-Hill. 1957. $7.50.
An introduction to modern approaches to two key areas of management concern. Emphasizes the relationship between performance in these areas and ultimate profits, and the importance of taking them into account in major planning decisions. Designed as a text.

B-43 **Queues, Inventories and Maintenance—Philip M. Morse.** 211 pp. Wiley. 1958. $6.50.
Subtitled "the analysis of operational systems with variable demand and supply", this book has been published under the aegis of the Operations Research Society of America. Written by a professor of physics at MIT it shows the application of queuing theory to inventory control and similar problems.

Personal Development

C-10 **Practical Speaking For the Technical Man—John E. Dietrich and Keith Brooks.** 319 pp. Prentice-Hall. 1958. $6.00.
A highly useful guide to the engineer or scientist who finds himself with increasing frequency in the unaccustomed role of making a speech in public. Gives practical tips on how to prepare and deliver a speech or paper in a way that will hold the attention of the audience.

C-11 **The Art of Living Without Tension—David Seabury.** 285 pp. Harper. 1958. $3.95.
An eminent psychologist gives good advice on how to overcome the tension which is an almost universal occupational hazard, particularly in the managerial field.

The Wider View

D-12 **America As A Civilization—Max Lerner.** 1036 pp. Simon & Schuster. 1957. $10.00.
A brilliant new book which may well become one of the classic analyses of American life. It is a full-length portrait of our country and its people, drawing on the work of a generation of social scientists and historians who have been trying to discover what makes America tick. Covers everything from our national resources to our habits, customs, tastes and way of life. Highly interesting as well as highly informative reading.

D-13 **High Talent Manpower For Science And Industry—J. Douglas Brown and Frederick H. Harbison.** 97 pp. Princeton. 1957. $3.00.
A broad review and appraisal of the increasingly important problem of developing adequate numbers of top scientific engineering and managerial manpower in the U. S. and the rest of the free world. Based on a four year study conducted by four leading American Universities, this book casts a new light on a vital problem.

D-14 **Madison Avenue, U. S. A. — Martin Mayer.** 345 pp. Harper. 1958. $4.95.
An incisive and highly interesting behind-the-scenes picture of the advertising industry as it really is.

D-15 **Swope of G. E.—David G. Loth.** 317 pp. Simon & Schuster. 1958. $5.00.
A biography of a distinguished business leader and the great company of which he was president. A fascinating picture of the interplay of a far-seeing man and developing management techniques to bring about a new level and type of industrial activity.

S.A.M Conference PROCEEDINGS

12th Annual S.A.M-A.S.M.E MANAGEMENT ENGINEERING Conference		☐ Member: $3.50	☐ Non-member: $5.00
2nd Annual MEASUREMENT OF MANAGEMENT Conference		☐ Member: $3.50	☐ Non-member: $5.00
11th Annual S.A.M-A.S.M.E MANAGEMENT ENGINEERING Conference	(April 26-27, 1956)	☐ Member: $3.50	☐ Non-member: $5.00
1st Annual MEASUREMENT OF MANAGEMENT Conference	(November 3-4, 1955)	☐ Member: $3.50	☐ Non-member: $5.00
OPERATIONS RESEARCH Conference	(September 29-30, 1955)	☐ Member: $7.50	☐ Non-member: $10.00
GUARANTEED ANNUAL WAGE Conference	(March 10-11, 1955)	☐ Member: $5.00	☐ Non-member: $7.50
10th Anniversary TIME STUDY & METHODS Conference	(April 28-29, 1955)	☐ Member: $3.50	☐ Non-member: $5.00
OPERATIONS RESEARCH Conference	(February 6-7, 1958)	☐ Member: $3.50	☐ Non-member: $5.00
HOSPITAL MANAGEMENT Conference	(March 14, 1958)	☐ Member: $3.50	☐ Non-member: $5.00
13th Annual S.A.M-A.S.M.E MANAGEMENT ENGINEERING Conference	(April 24-25, 1958)	☐ Member: $3.50	☐ Non-member: $5.00

Enclosed find my check ☐ (or) bill me ☐ for the sum of $.....
in payment of the Conference Proceedings checked above.

Name .....

Address .....

SOCIETY FOR ADVANCEMENT OF MANAGEMENT • 74 Fifth Avenue, New York 11, N. Y.

13th Annual S.A.M - A.S.M.E Management Engineering Conference

CERTAINLY those who attended the 13th Annual S.A.M-A.S.M.E Management Engineering Conference, which featured Cost Reduction, will agree that it was one of the best yet. Judging by the comments, the conferees "took home" many more than the "one $-saving idea" guaranteed in the conference literature.

How does it happen that this annual conference gets better and better with each passing year? How do you account for the almost legendary *esprit de corps* of the committees? Why does it continue to outdraw all other S.A.M conferences, even after thirteen years?

Based on a number of years of association with the conference there appear to me to be two major reasons: the Rotating Conference Committee, and the support of the National S.A.M Office Staff.

The men whose pictures appear on this page are the Rotating Committee who planned this year's successful conference. They are not amateurs! Each man serves on the committee for five years. Hence this Rotating Committee represents 30 collective man-years of Management Engineering Conference planning! Thus, it is not chance that each year's conference committee accepts the challenge of planning an even more successful conference. What better motivation could there be for committee *esprit de corps?* The success of any conference is determined to a very large degree by the planning experience of the committee members.

Perhaps the whole operation could be termed "A Management Team In Action". This is the key to successful conferences.

Oliver J. Sizelove
S.A.M General Chairman

OLIVER J. SIZELOVE
S.A.M General Chairman

Mr. Sizelove is Chairman of the Department of Management Engineering at Newark College of Engineering. He is Vice President of S.A.M Middle Atlantic Region.

V. DONALD SCHOELLER
S.A.M

Mr. Schoeller is Director of Management Development for Remington Rand Division of Sperry Rand Corporation, New York City.

ROBERT W. MacWILLIAMS
S.A.M

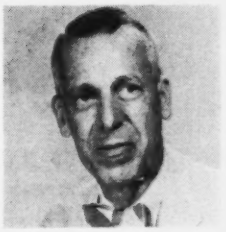
Mr. MacWilliams is Supervisor of Engineering for Ernst & Ernst of Boston. He is Vice President of S.A.M Northeastern Region.

WALTER E. ROBBINS Jr.
S.A.M

Mr. Robbins is Chief Industrial Engineer of East Newark Plant, Engelhard Industries, Inc., Baker Contact Division.

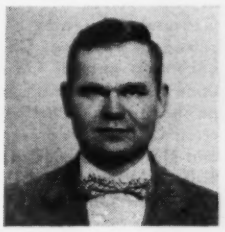
VICTOR M. GELIN
S.A.M

Mr. Gelin is Manager of Methods and Standards of the Pigments Department of E. I. du Pont de Nemours and Company, Wilmington.



VICTOR A. GROVE
A.S.M.E General Chairman

Mr. Grove is Chief Industrial Engineer for the DeLaval Steam Turbine Company, Trenton, N. J.

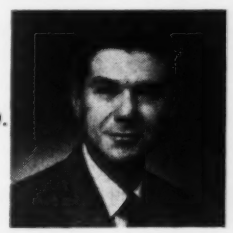


WALLACE J. RICHARDSON
A.S.M.E

Professor Richardson is Associate Professor of Industrial Engineering at Lehigh University, Bethlehem, Pa.

FRED GROPPER
A.S.M.E

Mr. Gropper is Group Supervisor, Engineering Dept., E. I. du Pont de Nemours & Co., Wilmington.



ARMAND V. FEIGENBAUM, Ph. D.
A.S.M.E

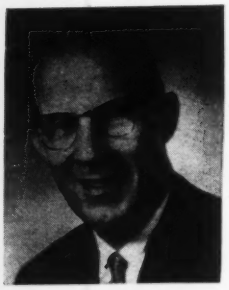
Dr. Feigenbaum is Manager of Quality Control for the General Electric Company, New York.

JAMES L. RIGASSIO
A.S.M.E

Mr. Rigassio is Chief Industrial Engineer for the Ethicon, Inc., Somerville, New Jersey.

S. A. M *Newsletter*

Current news of interest to all S.A.M Members, specifically for the 900 Chapter and National Officers of the Society.



HAROLD R. BIXLER
Executive Vice President

SANTA CLARA VALLEY CHAPTER INAUGURATED. Welcome to the new Santa Clara Valley, California, Chapter of the Society, which received its National Charter on March 19th, to become a part of the North California Region upon its inauguration. National Officers participating were WILLIAM R. WILLARD, San Francisco Chapter, representing the Western Area, and National Executive Vice President Harold R. Bixler, who presented the Charter and spoke on "The New Challenges Facing The Professional Manager". Officers of the New Chapter are President DWIGHT E. MOORHEAD, Manager of San Jose Motor Plant of General Electric; Vice President DAVID E. OLSSON, Administrator of San Jose Hospital; Secretary BENJAMIN VOLK, Logistics Engineer, Lockheed Missile Systems Division; Treasurer HOYT F. KELLEY, Vice President of Pioneer Investors Savings and Loan Association; National Director JOSEPH TRICKETT, Director of Management Center, University of Santa Clara.

BUSINESS AND ECONOMIC CONDITIONS. Managers and executives concerned with the current economic situation will find most useful information in the April issue of the monthly letter published by the First National City Bank. Its contents cover General Business Conditions, Recessions Compared, Business Spending Prospects, Consumers and Prices, Proposals for Government Action, Federal Spending Versus Tax Relief, Public Works, Irreversibility or Government Expenditures, Debate on Taxes, Excise Taxes, Stimulate Business Spending and Corporate Earnings in 1957. Copies may be obtained by writing First National City Bank of New York, 55 Wall Street, New York City. You may want to be placed on their regular mailing list for this excellent publication.

CHAPTER ORGANIZATION BEGUN IN SANTA BARBARA, CALIFORNIA. Further expansion of S.A.M on the West Coast is indicated in a Chapter Organization meeting recently held in Santa Barbara, under the leadership of LEONARD I. MAYER, Aerophysics Development Corporation, a subsidiary of Curtiss-Wright, and DR. CLOVIS SHEPARD of the University of California. The nucleus group is composed of representatives of various firms in the area now participating in a local course entitled "Leadership Principles and Practice". National Secretary HUGO W. DRUEHL and Executive Vice President HAROLD R. BIXLER participated in the meeting.

NATION'S BUSINESS AND S.A.M. The several hundred thousand readers of **Nation's Business,** published by the U.S. Chamber of Commerce, were given opportunity in the April issue of that magazine to study the opinions of several leading S.A.M members and official representatives of various articles dealing with individual phases of management development. DR. FRANCIS BRADSHAW, retiring National Board Chairman of the Society, and President of Richardson, Bellows, Henry & Company, and DR. VINCENT A. FLYNN, S.A.M Research Director, are quoted in an outstanding article on "Manager's Seven Deadly Sins." This contains the comments of psychologists, management consultants, psychiatrists, clergymen, college professors, and executives in attempting to identify the human weaknesses in business and seek out ways to conquer them. The Seven Deadly Sins they specify are Pride, Envy, Laziness, Anger, Unchastity, Greed and Gloominess.

LEWIS A. ALLEN, prominent S.A.M member on the West Coast, is the author of an excellent article, "Conformity Can Stimulate Ideas". Dr. Flynn is again quoted in the section on Executive Trends in answering the question "What Causes Effective Executive Action?" This is another good issue of **Nation's Business,** available at 1650 'H' Street, N.W., Washington 6, D.C.

NEW CHAPTER DEVELOPMENTS IN VANCOUVER. More S.A.M growth in the northwest was indicated in the organization meeting for new chapter development in Vancouver, British Columbia, at the time of recent inauguration of the S.A.M chapter at the University of British Columbia. Executive Vice President HAROLD R. BIXLER represented the national officers in these activities and spoke on "S.A.M And The New Role of Management in Business and Industry". Representative leaders of industry, business, education, and government were present at the University for discussion of senior chapter organization, under the sponsorship of Professor HUGH C. WILKINSON, Chairman, Division of Production of the Faculty of Commerce, and Professor D. C. AIRD, College of Commerce and Business Administration, along with Dean McPHEE, representing the University and the community at large.

MANAGEMENT AND TECHNICAL POSITIONS AVAILABLE. S.A.M members interested in obtaining additional foreign experience will want the latest available information regarding positions announced by the United Nations Technical Assistance Program. They are in the fields of Economic Surveys, Industrial Development and Productivity, Natural Resources, Development and Power, Public Finance, Statistics, Transport and Communications, Social Development, Housing and Physical Planning and Building, Community Development, Social Services and Public Administration. The jobs are located in a large variety of countries abroad, particularly in Asia, Africa and South America. For details write to Technical Assistance Administration and Recruitment Services, United Nations, New York 17, N.Y.

The U.S. Civil Service Commission is now conducting competitive examinations for the position of Administrative Officers in the GS-12—GS-15 Classification, and for the position of Organization and Methods Examiner, GS-9—GS-11. Apply to Second U.S. Civil Service Region, Federal Building, Christopher Street, New York 14, N.Y.

ADVANCED MANAGEMENT SERVES FOREIGN COUNTRIES. Typical of the increasing number of responses and requests from a relatively large number of foreign countries about the usefulness of S.A.M's official publication, Advanced Management, **is the following recent one from Japan: "I wish to take this opportunity to thank you for the assistance you are rendering the Japanese people to understand management activities as practiced in the United States. The articles from** Advanced Management **are very much appreciated by our students and by peoples of Japanese industries. I am sure that your permission to reproduce the additional articles will be appreciated by the peoples interested in keeping up with the current development of management activities. Mr. TOM S. KAWAGUCHI, Chief, International Division, Nippon Business Company."**

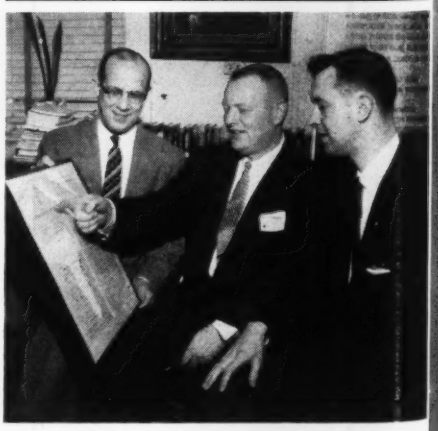
WE FINALLY GOT BRAD OFF GUARD! All members will be delighted to know that, for once, FRANK BRADSHAW was finally floored by the recent presentation to him of the previously mentioned inscribed silver tray, on behalf of the National Officers, as a tribute to his leadership for S.A.M over a period of years. Here is his reaction in writing:

"Dear Signer of Silver Platters: If you will excuse my waxing poetic, I would raise the question as to what could be flatter than a platter and the answer would be: the person who is unexpectedly presented with a platter.

"Never in my life before have I been so overwhelmed and flabbergasted. My secretary says that she will always regret the fact that she was not allowed to be present at the one time when I was really without speech. I will say, however, that she admits that simply depriving me of speech would not justify repeating this cost very often. My speech, so far as she sees it, is not that bad.

"I do not believe that I have ever been so touched in the region of sentiment and gratitude for friendship as I was by the complete surprise and the mystifying occasion that you lovable people provided for me. I'm afraid that my behavior, to say the least, was uncouth and may have appeared to be ungracious and unappreciative. I can assure you that I was simply floored. My heart will always be warm when I remember that you thought enough of us to go to that trouble and expense and first of all to even think of the idea. I only hope that in some way in the years ahead I can, by continued interest and effort, show S.A.M how much I appreciate this beautiful silver tray, and your kind and flattering thoughts and words."

DATA PROCESSING DIGEST. S.A.M members working in the field of Operations Research will be interested in the Data Processing Digest, **a service of Canning, Sisson and Associates, which**



S.A.M Welcomes A New Student Chapter

(L to R) S.A.M. Executive Vice President **Harold R. Bixler** presents a S.A.M Charter to the new GONZAGA UNIVERSITY Chapter (Spokane, Washington) to Dean of the Gonzaga School of Economic and Business Administration **Richard F. McMahon** and E & B student **Richard E. Dadey** of Ogdensburg, N.Y., president of the student S.A.M Chapter.

contains excellent source material. Authentic data processing articles and references are included under the content headings of General Information, Applications, Equipment, Programming, Comment, Training, Meetings, and selected references. Write to Canning, Sisson and Associates, 1140 So. Robertson Blvd., Los Angeles 35, California.

CHAPTER NEWS—IN SHORT. NEW YORK Chapter co-sponsors a panel meeting on International Manager Development with the Council for International Progress in Management . . . INDIANAPOLIS Chapter has developed an excellent 30-item questionaire for chapter members . . . DAYTON Chapter splices in various discussion topics during the dinner prior to and not necessarily related to the principal talk of the evening, for development of opinion on a round table basis . . . TWIN-CITY Chapter maintains its leadership in the upper Mid-West by co-sponsoring the 16th Annual Industrial Relations Conference with the University of Minnesota . . . SAN FRANCISCO repeated a smash hit this year in conducting its annual Chief Executive Night, featuring and limited to participation by members and the chief executive officers of their respective companies . . . The NORTHEASTERN REGION chapters of BOSTON, BRIDGEPORT, HARTFORD, NEW HAVEN PROVIDENCE, WESTERN MASSACHUSETTS, and WORCESTER, conducted a very successful all-day conference on "The 'I' In Profits" at the University of Bridgeport . . . LOS ANGELES Chapter is conducting a full year monthly meeting program on the same theme, emphasizing executive development in the broad sense, with panel discussions at most meetings on various phases of this subject . . . DALLAS Chapter is planning a series of workshops to carry the small owner-managed company all the way through partnership, formation into a corporation, growth into departmental delegation of responsibility, development of line and staff functions, growth through merger and acquisition . . . BALTIMORE Chapter continues its activities in sponsoring Junior Achievement in the area by making an award for the best stockholder's report submitted by the various participating J.A. companies . . . Further details on the above significant S.A.M chapter affairs can be obtained by writing the President of the respective chapter, whose address you will find in the Blue Book of Chapter and National Officers, sent by the National Office to each chapter.

SELECTED REFERENCES — MANAGEMENT PUBLICATIONS. Additional Management Aids for the improvement of small business are available in large quantity through the Small Business Administration, with regional office addresses in the following cities: Boston, New York, Philadelphia, Richmond, Atlanta, Cleveland, Chicago, Minneapolis, Kansas City, Dallas, Denver, San Francisco, Seattle, Los Angeles and Detroit. There are several hundred individual publications dealing with various managerial phases of small business and with various kinds and classifications of small business and industry. Also available is the U.S. Government Purchasing Directory, a "comprehensive guide to who buys what and where" in the military and civilian agencies of the Federal Government, and the necessary procedures for selling to them. It contains a listing of military installations by states which are authorized to make local purchases. All publications may be obtained through Superintendent of Documents, Government Printing Office, Washington 25, D.C.

An up-to-date reference on outstandina books in Industrial Relations may be obtained from the Industrial Relations Section, Princeton University, Princeton, N.J. It contains summaries of some 20 new books in the field of industrial and personnel relations as an addition to previously mentioned bibliographies on this subject.

S.A.M chapters with civic affairs programs will be particularly interested in new pamphlet by the American Bar Association designed to emphasize the importance of law in our system of government and in promoting our progress and development through preservation of our rights and freedoms. Note that the Association will furnish outstandina speakers to chapters in relation to such activities. Write CHARLES S. RHYNE, President, American Bar Association, 400 Hill Bldg., Washington 6, D.C. ■

S.A.M Research Publications . . .

COLLECTIVE AGREEMENTS ON TIME AND MOTION STUDY

by G. Jay Anyon, Ph. D.

Simplify negotiations with this handbook in which over 300 separate types of stipulations throughout a broad sampling of American industry are examined.

SAM Members: $3.50
Non-Members: $4.50

CREATIVE TIME STUDY AND METHODS

A collection of 21 articles concerned with the latest developments in the Industrial Engineering field.

SAM or ASME Members: $3.50
Non-Members: $5.00

Order from:

The Society for Advancement of Management
74 Fifth Ave., New York 11, N. Y.

TYPICAL S.A.M CHAPTER ACTIVITIES—JUNE 1958

CHAPTER	SUBJECT	SPEAKER	PLACE	DATE
Hartford	Outing & Business Meeting		Bond Hotel	19
Hudson Valley	"Humanics & Directed Energy"	**Jerome Barnum**, Chairman, Jerome Barnum Associates: Director, Directed Energy Institute	Hot Shoppe Restaurant, Albany, N. Y.	10
Kansas City	"Human Engineering"	**Dr. J. W. Dunlap**, Dunlap & Associates, New York	Elks Club	4
Knoxville	"Executive Development"	**Jason Cooper, Jr.**, Coordinator of Management Development, ESSO Standard Oil Co., New York	Deane Hill Country Club	10
	Plant Visitation		Plasti-Line, Inc., Knoxville, Tenn.	17
Milwaukee	Annual Fun Night		Engineer's Society Bldg.	12
No. Alabama	Ladies Night			11
Poughkeepsie	Wind-up Dinner Meeting	Speaker from S.A.M National Office	Nelson House	10
Reading	Ladies Nite—Novelty Program		Iris Club, Wyomissing, Pa.	9
Twin-City	Final Report Meeting, Installation of Officers		Normandy Hotel	12
Washington	Annual Chapter Social		Occidental Restaurant	25

University Division Expands in 1958

During this academic term, the following University Chapters were chartered and are now in full operation, rendering real service to the students, the institution and the community. They all are part of a dynamic, international management education movement. Congratulations to each for this significant achievement!

Arizona State College
Tempe, Arizona

Gonzaga University
Spokane, Wash.

C. W. Post College of L. I. University
Greenvale, N. Y.

Loyola College
Montreal, Canada

McGill University
Montreal, Canada

New York University School of Com. Accts. & Finance,
New York City

Okla. State Univ.
Stillwater, Okla.

Santa Maria Catholic Univ.
Ponce, Puerto Rico

Temple University, Evening Division,
Philadelphia, Pa.

Univ. of Arizona
Tucson, Arizona

Univ. of Arkansas
Fayetteville, Ark.

Univ. of Brit. Col.
Vancouver, Canada

Univ. of Georgia
Athens, Ga.

Univ. of Kentucky
Lexington, Ky.

University of Tulsa
Tulsa, Oklahoma

Univ. of Wisconsin
Milwaukee Center

Univ. of Delaware
Newark, Delaware

Univ. of Maryland
College Park, Md.

Univ. of No. Dak.
Grand Forks, N. D.

Clark University
Worcester, Mass.

Allegheny College
Meadville, Pa.

UNIVERSITY CHAPTER DIVISION
Performance Awards Reports
As of April 1, 1958

Babson Inst.	4790	Univ. of Detroit	2500
American Univ.	4695	W. Va. Univ.	2465
Rider College	4665	Univ. of Wisconsin Madison	2360
Boston College	4440	Georgia Inst. of Technology	2330
LaSalle College Evening Div.	4310	Univ. of Miss.	2260
Indiana Univ.	4245	W. Mich. Univ.	2200
Univ. of Kansas	4025	N. Tex. State Col.	2175
Ohio Univ.	3985	St. John's Univ.	2175
Univ. of Houston	3800	State College of Washington	2030
Univ. of Pittsburgh	3735	Guilford Col.	2020
Pennsylvania Military Col.	3620	Rutgers Univ.	1985
Boston Univ.	3525	Wayne St. Univ.	1935
Univ. of Conn.	3510	San Diego State College	1935
Clarkson College of Technology	3460	Univ. of Mo.	1900
Univ. of Calif. Berkeley	3410	Univ. of S. Calif.	**1830
Rensselaer Polytechnic Inst.	3360	Penn State Univ.	1820
Univ. of Minn.	3250	†Santa Maria Cath. Univ. of P. R.	**1660
Univ. of Texas	3250	Univ. of Penn.	1535
Miss. State Col.	3232	Butler Univ.	1480
Franklin and Marshall Col.	3225	Univ. of Rich.	1455
Loyola College of Chicago	3155	Georgetown Univ.	1340
Xavier Univ.	3120	Univ. of Okla.	**1250
Los Angeles State Col.—Ramona	3048	Geo. Washington University	**1150
Case Institute of Technology	2990	DePaul Univ.	**1100
Tenn. Polytechnic Institute	2970	La. State Univ.	1025
Duquesne Univ.	2955	Univ. of Cin.	*930
Syracuse Univ.	2920	Seton Hall Univ.	**815
Univ. of Illinois	2915	City College of New York	*650
Ohio State Univ.	2890	Roosevelt Univ.	*645
Miami Univ.	2835	University of Baltimore	*640
Kansas State Col.	2630	†Univ. of Md.	*595
Memphis State University	2605	Clemson Col.	*600
Univ. of California (Los Angeles)	2585	L. A. State Col. San Fernando	*425
Univ. of Alabama	2555	†Temple Univ. Evening Div.	*300
Alabama Polytechnic Institute	2540		

* One report
** Two reports
† Newly chartered

University Chapter Membership Awards

During the *second semester* of the current academic year, 33 University Chapters received membership awards "in recognition of their achievement in advancing the art and science of management and of their contribution to the growth of the Society through their significant increase in membership."

On April 1, 1958, Mississippi State College led the chapters with their membership of 274; while Indiana University followed with their membership of 273, both members of the "200 Club".

Pennsylvania Military College and Roosevelt University won top honors in membership growth with an increase in membership of 500% while North Texas State College increased their membership by 357% during the academic year.

Congratulations to these chapters for their outstanding records of achievement.

The following Chapters won membership in the "100 Club" on the basis of a membership of 100 or more:

American University
Georgia Institute of Technology
Long Beach State College
Los Angeles State College (Ramona)
New York University, Sch. of Com., Accts. & Finance
Northeastern University
Ohio University
Pennsylvania Military College
St. Peter's School of Business
Tennessee Polytechnic Institute
University of Alabama
University of Arkansas
University of Connecticut
University of Houston
University of Illinois
University of Kansas
University of Maryland
Villanova University
Xavier University

A special salute to the University of Maryland, University of Arkansas and the Long Beach State College Chapters for commencing operations this Spring Term with a charter membership of over 100.

The following institutions received membership growth awards:

American University
Antioch College
Babson Institute
George Washington University
Los Angeles State College (S.F.V.C. Campus)
North Texas State College
Ohio State University
Pennsylvania Military College
Rensselaer Polytechnic Institute
Roosevelt University
San Diego State College
University of Mississippi
University of Puerto Rico
Washington State College

UNIVERSITY CHAPTER DIVISION
Membership Standings
As of April 1, 1958

Miss. State Col.	274	Franklin and Marshall Col.	53
Indiana Univ.	273	Case Institute of Technology	52
*Univ. of Md.	168	W. Va. Univ.	51
Univ. of Conn.	161	Univ. of Miami	51
Georgia Institute of Technology	155	Univ. of P. R.	49
Northeastern Univ.	150	Georgetown Univ.	48
Villanova Univ.	149	Syracuse Univ.	47
Ohio Univ.	138	Univ. of Cin.	47
Tenn. Polytechnic Institute	134	Univ. of S. Calif.	47
Univ. of Houston	134	La. State Univ.	46
Penn. Military Col.	129	*Univ. of N. Dak.	46
Univ. of Ala.	122	Lamar State Col. of Technology	45
*Long Beach State College	120	South. Meth. Univ.	45
*Univ. of Ark.	116	Lawrence Institute of Technology	44
Univ. of Ill.	113	*C.W. Post Col. of Long Island Univ.	44
St. Peter's School of Business	106	Clemson College	43
American Univ.	105	University of Calif. Berkeley	43
L. A. State Col. Ramona	105	Clarkson Col. of Technology	42
*New York Univ.—Sch. Comm., Accts. & Fin.	103	Antioch College	41
Univ. of Kansas	100	State Col. of Wash.	40
Boston Univ.	98	Univ. of Calif. Los Angeles	40
L. A. State Col. San Fernando	96	*Univ. of Delaware	40
LaSalle College (Day Div.)	95	*Arizona State Col.	39
Boston Col.	92	Fenn Col.	39
*Univ. of Ky.	91	Hofstra Col.	39
Ohio State Univ.	90	Univ. of Detroit	38
Penn. State Univ.	88	Univ. of Michigan	38
Univ. of Texas	87	Univ. of Oklahoma	38
Woodbury Col.	85	Butler Univ.	37
Temple University (Day Division)	82	DePaul Univ.	37
Univ. of Wisc.—Madison	80	George Washington University	37
Univ. of Minn.	77	Wayne State Univ.	36
Babson Institute	76	St. John's Univ.	35
N. Tex. State Col.	75	*Santa Maria Catholic Univ. of Puerto Rico	35
Roosevelt Univ.	75	Univ. of Rhode Island	35
Rider College	74	*Temple Univ. Evening Div.	34
Univ. of Mo.	73	Univ. of Baltimore	34
Drexel Inst. of Technology	72	*Univ. of Arizona	31
Univ. of Pitts.	71	*Univ. of British Columbia	31
Univ. of Tenn.	71	Villa Madonna Col.	29
Rensselaer Polytechnic Inst.	70	Otterbein Col.	28
*Univ. of Wisc.—Milwaukee	70	Southern Technical Institute	27
Guilford Col.	69	Seton Hall Univ.	26
Duquesne Univ.	68	Univ. of Chattanooga	26
Newark Col. of Engineering	68	Georgia State Col.	25
Sacramento St. Col.	68	*Loyola Col. of Montreal	25
Rutgers Univ.	67	*McGill Univ.	25
Kansas St. Col.	65	*Univ. of Tulsa	25
Miami Univ.	65	*Univ. of Georgia	24
W. Mich. Col.	65	Marian Col.	22
Univ. of Rich.	64	Univ. of Dayton	22
LaSalle College (Evening Div.)	62	St. Louis Univ. Instit. of Techn.	21
Bowling Green State Univ.	60	*Oklahoma State University	19
Univ. of Scranton	60	Louisiana Polytechnic Institute	17
Alabama Polytechnic Inst.	59	Michigan State Col.	17
Memphis St. Univ.	59	Wilkes Col.	17
*Gonzaga Univ.	58	New York Univ.	16
Univ. of Fla.	58	Yale Univ.	15
Univ. of Miss.	58	Emory Univ.	14
San Diego St. Col.	56	Univ. of Bridgeport	13
Univ. of Penn.	56	Oregon State Col.	9
Loyola Univ. of Chicago	55		
Cornell Univ.	54		

*Newly chartered chapters

NOTICE TO ALL MEMBERS

Proposed Changes in By-Laws:

Section I.—Membership—Items b, c, and g.

Section II.—Initiation Fees.

Section III.—Annual Dues.

1. Eliminate the Associate Grade.

2. Establish a Professorial and Civic Grade with dues at $15.00 a year and an entrance fee of $5.00. The definitions of the two categories comprising this grade are:

a. PROFESSORIAL — Administrators and faculty members of non-profit educational Institutions who function in a capacity that directly influences the development and preparation of others for assuming responsible positions in one or more of the several areas of scientific management.

b. CIVIC—Executives, administrators, and professionals who hold responsible positions directly in Federal, State or local government or other non-profit civic organizations, or individuals who are in preparation for assignment to such positions, and who are required to have had extensive education, training or experience or some combination thereof, which qualifies them to exercise independent judgment in the application of the principles, theories, and techniques of scientific management in government administration or civic affairs.

3. Increase the age limit for the Junior Grade from the present 26 years to 30 years.

4. Retain the Fellow Grade but modify the requirements of qualification for the grade as follows:

Any member, upon the petition of his Chapter Board of Directors or the National Board of Directors, may be elected a Fellow for contribution to the advancement of management through activities in the Society, by an affirmative vote at a National Board Meeting after he has met the qualifications listed below:

a. Has been a member of the Society for ten years and,

b. has been an elected National Officer, or an appointed National Vice President, or a Chapter President who has served the National as an Officer, Director or Chairman of a major committee and,

c. has served as a National or Chapter Officer (elective or appointive) for five years.

Section V. Board of Directors—Meetings.

Section VI. Executive Committee — Meetings.

That there be one meeting of all National Directors of the Chapters in April, for budget and policy considerations; and that there be periodic meetings of the National Executive Committee throughout the fiscal year—to be composed primarily of the elected National Officers and the elected Regional Vice Presidents.

Section VIII. Officers

(An addition to Paragraph 2)

The employment and compensation of the Executive Vice President will be determined by a Committee comprised of the President, 1st Vice President, Chairman of the Board, and the two immediate consenting past Board Chairmen.

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3. *What authority shall a division manager delegate to accomplish his responsibility?*
4. *Because these areas of the company are interdependent, how can the various responsibilities be integrated to the best interests of the total organization?*

After this has been done—charted out, understood and accepted as fact—we have completed the first step. We now know "what exists." We may like what exists, or we way not. If we like it, we can recognize it for what it is and live with it realistically. If we don't like it, the time has come for some long range planning of structure. It is very possible after we have seen what exists that we may rest uneasily because, in sharing authority, it may be our opinion that we have gone farther than necessary in violating the unity of command or "one boss" concept.

If this is the case, we should then structure out "the ultimate," and develop the structure that we would like to have in ten years. Then, in easy steps, we can "back up" to the structure that exists now. As we go through time we can make adjustments to evolve—to move firmly but not hastily—to the structure of our choice.

Until we recognize, understand and accept what exists now, improvement in the future would be difficult to attempt. Further, until line-staff is known to be an effect, or a sympton, rather than a cause, attempts to apply it in modern business would continue to cause anguish.

The cause has rested, does rest and will continue to rest, with the two questions: "What work must be performed to accomplish our goals?" and "What degree of authority must this work have to insure its accomplishment?" ■

POSITIONS WANTED

JUNE GRAD

Graduate June from Babson Institute. Young, ambitious, seek position in finance or management-corporation, bank, savings & loan. Box 1, Babson Institute, Wellesley, Mass.

BUSINESS MANAGEMENT ANALYST

22 yrs. exp. accounting interpretation and analysis at main office and dealer level with billion dollar company. BSME. Age 44. Resume on request. Motor City Employment, 1402 Industrial Bldg., Detroit 26, Mich.

(Continued from page 16)

ments of costs to alternatives. Similarly there has been no discussion of refinements having to do with the treatment of taxes, handling changes in patterns of receipts and expenditures overtime, or adjustment of formulae for special purposes. Nevertheless, the reader who has had only a casual interest in equipment analysis or but sporadic need to make either equipment analyses or decisions may have gained the impression that the quantitative approach, when its assumptions are seen through, is like a badly done modernistic play in which the same piece of scenery is made to serve so many purposes in rapid succession that the viewer is left bewildered.

There is no escaping the iceberg analogy for quantitative analysis—the bare structure of equations through which values are to be ground to get answers is the one-tenth that shows above the surface; the reasoning from which the equations derive, the qualifications attached to them, the preliminary steps to be completed before they are used, and the interpretation of the answers when they are secured compose the hidden remainder. It is true that quantitative analysis cannot be a complete substitute for judgment unless every element of uncertainty has been eliminated and every contingency foreseen. It is also true that it is a valuable aid to judgment for several reasons:

1. Quantitative analysis, done properly, requires that assumptions be made explicit, that criteria be identified, and that information be evaluated; in other words, it facilitates orderly and logical thinking to some purpose.
2. It helps to insure that all relevant factors will be considered.
3. Its tangible results—analyses which are written down—aid in making experience cumulative by providing records of forecasts and decisions which can be checked against subsequent events.

One way to increase the rationality of industrial investment decisions in general is to use quantitative analysis more and use it more wisely than now. Pointing out that its use involves the making of often difficult choices without absolute guides does not vitiate the proposition, for the choices must be made in any event, even if only by default. The hope that analysis can be as simple as A-B-C is forlorn; the fear that analysis is too difficult to be used is groundless. ■